This book is written as a practical field manual to be used by geologists engaged in mineral exploration. It is also hoped that it will serve as a text and reference for students in Applied Geology courses of universities and colleges. The book aims to outline some of the practical skills that turn the graduate geologist into an explorationist. It is intended as a practical “how to” book, rather than as a text on geological or ore deposit theory.

An explorationist is a professional, usually a geologist, who searches for ore bodies in a scientific and structured way. Mineral exploration professionals include a range of people: business people involved in financial and entrepreneurial activities in the mining industry, board members and company management no longer involved in day to day exploration but often with past hands-on experience, technical assistants, tenement managers, environmental and safety personnel, drillers, surveyors, IT specialists, geophysicists and geochemists, ore reserve specialists, various types of consultants, and the exploration geologists. Typically the exploration geologists are the jacks-of-all-trades with an overview of the team and the project.

Although explorationist is a somewhat awkward and artificial term, this is the only available word to describe the totality of the skills that are needed to locate and define economic mineralization. Even the mine geologist, attempting to define ore blocks ahead of the mining crews, is an explorationist. The most fundamental and cost-effective skills of the explorationist relate to the acquisition, recording and presentation of geological knowledge so that it can be used to predict the presence of ore – these are the skills that are the subject of this book.

Practical field techniques taught at undergraduate level are often forgotten and sometimes, although taught, are not reinforced by subsequent practice; some skills that the explorationist needs may never be adequately taught in the academic environment of universities. Special techniques and skills – or example, identifying prospective ground for acquisition, detailed prospect mapping or logging drill core

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1 Throughout the book, the rules of English grammar compel me, from time to time, to ascribe a sex to my protagonist. In the first edition I got around this by using the expression “he or she”; but this now seems to me an awkward circumlocution. In this edition I simply ascribe gender alternately.
or cuttings – seldom figure in basic training courses. Although no book can substitute for hands-on experience and demonstration, this manual aims to address some of these deficiencies.

The book does not offer a set of standard rules that must be invariably followed. It describes practical skills and techniques that, through the experience of many geologists, have been found to be effective. However, it is not the author’s intention to be prescriptive; each geologist has to develop their own techniques and will ultimately be judged on results, not the process by which these results were reached. In mineral exploration, the only “right” way of doing anything is the way that locates ore in the quickest and most cost-effective manner. It is preferable, however, for an individual to develop their own method of operation after having tried, and become aware of, those procedures that experience has shown to work well and which are generally accepted in industry as good exploration practice.

New ideas and techniques are constantly emerging and no book such as this can be regarded as being a final statement. To make this a useful document and to keep it up to date and relevant, geologists should use it critically.

The chapters of the book approximately follow the steps that a typical exploration programme would go through. In Chap. 1, the generation of new projects and prospects and the nature of the exploration process are described. In Chaps. 2 and 3 are descriptions of the various techniques employed in making geological maps from remote sensed reflectance imagery, surface outcrop and mine openings. Chapter 4 covers techniques employed by the explorationist to create new rock exposure – trenching, pitting, stripping and underground development. Chapters 5, 6 and 7 (supported by several Appendices) cover all aspects of drilling. These chapters constitute a major part of this book, reflecting the supreme importance of drilling to the explorationist. In Chap. 8 is a detailed description of the remote sensed images provided by Land observation satellites – a modern day boon to explorationists. Although this book is primarily concerned with geological methods, in Chap. 9 a brief overview is given of the more commonly used techniques of exploration geophysics and geochemistry. Finally, Chap. 10 discusses digital exploration data bases and outlines the use of geographical information systems (GIS) and exploration software for the storage, manipulation and presentation of digital exploration and mining data.

This second edition has been greatly expanded from the original 1997 edition to reflect changes that have taken place in exploration methods over last 10 years. Basic geological field techniques still constitute the core skill for the explorationist and are the subject of a significant part of the book. However new technological advances have expanded the range of tools available to her. In diamond drilling, faster and more reliable systems for orienting core have made this procedure almost routine and have led to an increased awareness on the value to be got from quantitative structural logging. Satellite navigation systems have become much more accurate thus expanding the role that GPS can play in providing survey controls for detailed geological mapping, and the collection of geochemical and geophysical data. New, very high resolution, commercial land observation satellites increasingly offer imagery that rival the best of air photography both in resolution and price.
The desk top and laptop computers of today offer an almost exponential increase in processing power, memory capacity and graphics ability which, combined with new powerful software packages and sophisticated instrumentation, have revolutionised traditional geophysical and geochemical techniques.

New software programs available today allow vast amounts of data to be processed and analysed, and this leads to a tendency for the present day explorationist to spend more time in front of a monitor than in the field. Digital data, massaged and presented as multi colour 3-D surfaces can acquire a life of its own, quite divorced from the reality it is supposed to represent. There is an increasing danger that by focussing on data handling the explorationist loses sight of the need for quality data acquisition. The underlying philosophy behind much of this book is that, if geological data is to be of value in finding ore bodies, ideas and insights must be used in a structured way to control all stages of data handling from field collection through to final presentation. In these days of electronic storage and processing of mass data, it is worth remembering the well-known quote\(^2\): 

\text{Data is not information}
\text{Information is not knowledge}
\text{Knowledge is not understanding}
\text{Understanding is not wisdom}

The book outlines some geological techniques for acquiring knowledge. The rest is up to the reader.

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\(^2\) Anonymous, but almost certainly adapted from: “Where is the wisdom we have lost in knowledge? Where is the knowledge we have lost in information” (T.S. Eliot)
Geological Methods in Mineral Exploration and Mining
Marjoribanks, R.
2010, XV, 238 p., Hardcover
ISBN: 978-3-540-74370-5