Magnetic and Electrical Separation, Vol. 6, pp.47-49
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Book Reviews

THE MAGNETIC ANISOTROPY OF ROCKS

By D.H. Tarling and F. Hrouda
Chapman and Hall, London, U.K. 1993, xi+217 p, hardcover £40.00, ISBN 0–412–49880–4

This book by Tarling and Hrouda presents an overview of magnetic anisotropy of geological material in a broad sense. Evidently, magnetic anisotropy is of interest to those working in paleomagnetism, but the book is addressed to a wider audience: structural geologists, sedimentologists, soil scientists, economic and engineering geologists who could use magnetic anisotropy to their advantage. This is because the magnetic fabric, as defined by the anisotropy is a sensitive low–strain state indicator. Moreover, the anisotropy of the low–field or initial magnetic susceptibility (AMS) in particular is conveniently measured compared to other laboratory strain analysis techniques, which makes the magnetic methodology attractive to use.

Tarling and Hrouda's book can be divided into two parts: the first three chapters discuss various aspects of the anisotropy methods while the last three chapters are more 'result–orientated'. In Chapter 1, an introduction to the physical and theoretical background is given, with emphasis on statistical processing of the AMS results. Throughout the years, various ways of representing the AMS ellipsoid have been proposed resulting in a myriad of 'anisotropy parameters' conveniently assembled in a table. The use of Jelinek's parameters is advocated and the authors continue to use these in the remainder of the book. Of course, these parameters themselves are quite correct, but for workers outside the field this may lead to a wrong impression that they are in wide use which is not the case.

Chapter 2 is devoted to a discussion of the magnetic mineralogy, of course in relation to magnetic susceptibility and its anisotropy. Emphasis is put on AMS aspects, not so much on anisotropy of various remanence types. It is a useful overview though statements regarding the decomposition temperature of pyrrhotite (a very anisotropic group of minerals) are not fully correct. Greigite may also be more important than anticipated because its occurrence is increasingly documented in sediments.

In Chapter 3 sampling and laboratory techniques are discussed, the principles behind various instruments are given. Anisotropy of different types of remanence which may complement AMS data is briefly treated. Methods to discriminate anisotropy contributions are discussed. This chapter serves as a good basis for those interested in acquiring their own anisotropy data.

Examples of primary magnetic fabrics (Chapter 4 on sediments and igneous rocks) and of the secondary magnetic fabrics of metamorphic rocks (Chapter 5) are treated in the second part of the book. The final concluding chapter sketches

problems and prospects for future research. This part of the book is structured as a literature review which can make it difficult to extract the essential from a large body of data.

Quite a large number of studies is discussed though it should be realised that the cited references reflect the authors' personal preferences. It is unfortunate that the current discussion on horizontal and/or vertical flow in the dyke systems as a function of distance to the eruption centre could not have been included. When discussing the 'case histories', the interpretation of anisotropy data in terms of mineralogy is regrettably slightly underexposed.

In the final chapter a practical overview, in flowchart or table format, of how to tackle an anisotropy problem: which method is most suited, which instrumentation should be preferably used, possible pitfalls when interpreting data, would have been useful, in particular for workers not fully engaged inn the field.

In summary, Tarling and Hrouda's book is the only comprehensive book available on magnetic anisotropy, a subject of interest to a wide range of earth scientists, It is, therefore, a useful reference when acquiring and interpreting magnetic anisotropy data.

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MINING AND METALLURGY IN SOUTH AFRICA: A PICTORIAL HISTORY

Compiled by A. J. Cowey.
Published by Mintek, Randburg, South Africa, 1994. Hardcover, 120 pp, US$55.00

South Africa's greatest natural heritage is its mineral riches. The country produces today more than 60 different minerals from over 1000 mines and quarries. The discovery of diamonds in the Cape Colony in 1867 attracted the capital and entrepreneurs needed to exploit this important resource. With the construction of the railway from the Cape to Kimberly, these developments laid the necessary physical and monetary foundations that enabled the exploitation of an even greater asset, Witwatersrand gold, discovered in 1886.

In a few short years the South African economy was transformed from an agricultural–based to a mining–oriented one, and with this change came the secondary and tertiary industries. Present mineral production in South Africa contributes more than 10% of the nation's GNP and accounts for about 46% of the value of its exports.

It is thus rather surprising that no publication on South Africa's colourful mining and metallurgical history in pictorial form has ever been produced. To celebrate the centenary of the South African Institute of Mining and Metallurgy, and the diamond jubilee of Mintek, this research and development organisation has published a book that should find its way to bookshelves or coffee tables of all

those who are interested in minerals and in the events that led to the development of the world leader in many branches of mining and metallurgy.

The book is divided into chapters according to materials (diamonds, gold, platinum, iron and steel, ferroalloys, coal, uranium, aluminium, copper, lead and zinc, tin and industrial minerals). In each chapter, Cowey outlines the history of each commodity and the developments in mining and extraction technologies, all this in a very readable and absorbing way. Even those who would not venture into even an undemanding technical treatise will certainly be fascinated by the wide collection of photographs that make up at least 50% of the book's content. Some of the rare photographs, taken as early as in 1886, capture those milestones that made South Africa a mineral treasure house. Other photographs record the current sophisticated and often unique mining and metallurgical activities.

Apart from the historical and esthetic factors, the real value of Cowey's book lies in the fact that it describes, in word and picture, a triumph of invention, enterpreneurship and technology, against enormous odds, which had enriched our world.

J. Svoboda