Meeting of minds in a magnetic field

Robert S. Coe

Geomagnetism of Baked Clays and Recent Sediments.

Edited by K.M. Creer, P. Tucholka and C.E. Barton.

Elsevier Scientific: 1983. Pp. 324. Dfl. 125, \$53.25.

K.M. Creer and his co-editors frankly confess to holding "mixed views about the publication of symposium proceedings". Such pessimism was misplaced; to my mind, they have succeeded admirably in avoiding the pitfalls that doom most books of this genre to a limited readership and transient life.

Several factors have contributed to the success of this volume. First, the subject of geomagnetism has entered one of those periods in which the various sub-disciplines are bubbling with excitement and appear to be converging on common (but as yet dimly perceived) ground. Satellites such as MAGSAT have revolutionized the business of global measurement and description of the present geomagnetic field, cryogenic magnetometers have greatly increased the rate that data about the ancient geomagnetic field can be obtained from weakly magnetized rocks, and computers have immeasurably improved our ability to store and manipulate data and perform the calculations required for increasingly sophisticated models of geodynamos. Geomagnetists are now talking to palaeomagnetists; theory is meeting observation and experiment.

Secondly, the Fourth Assembly of the International Association of Geomagnetism and Aeronomy held in 1981 in Edinburgh—including the Symposium on Time Scales of Secular Variation, from which the core of papers published in this volume is drawn—was graced with an unusual number of truly fine contributions, and came at a time when the subject is manageable in scope and sorely in need of review. The main reason, however, that this book is definitely more than just another symposium volume lies in the clear effort taken by the editors to achieve a logical organization, adequate coverage and balance, and a semblance of uniformity of style.

The central theme is the behaviour of the geomagnetic field over the past several tens of thousands of years, as deduced from the remanent magnetization of baked clays and lake sediments. The 33 contributions (by 40 authors) are grouped into four chapters, the first of which contains brief and often interesting critiques of the most relevant magnetization processes, including thermoremanent magnetization, detrital remanent magnetization and shear

remanent magnetization. The second consists of similar treatments of selected dating techniques (palynology, radio-carbon, tree-rings and varves, lead-210 and thermoluminescence).

The third chapter is the longest and most highly developed. It is distinguished by a particularly clear and informative review of techniques for archaeointensity determination by M.J. Aitken; by summaries of archaeomagnetic results up to 1981 for Greece, Bulgaria and Yugoslavia, Egypt, the Near East, the USSR, China, Japan, the United States, Peru and Australia; and by a perceptive analysis of global intensities for the past 50,000 years by M.W. McElhinny. The final chapter consists of presentations of palaeomagnetic data—many of which show encouraging consistency—of lake sediments from Europe, North America, Argentina and Australia, and cave sediments from Europe, as well as reviews of mathematical techniques for analysis of directional data as a function of depth or time. Throughout the book, the various topics are woven together by means of introductory sections and occasional

summary discussions within each chapter. An "Epilogue" by the editors, containing their own analysis, interpretation and conclusions, also helps to unify the book and is a stimulating contribution in its own right.

One can always find things to complain about. I found myself wishing at times that the coverage were more encyclopaedic, and resolving to get my eyes examined because of the small camera-ready type-face with commas that are almost indistinguishable from full points. While it is impossible for a symposium volume to have the same intellectual impact as a book written by one or a few excellent scientists who are also excellent writers, this is about as close as you can get; newcomers can read it as a detailed and relatively unbiased introduction to the field, and practising specialists will find it a handy reference for quite some years. Simply put, it is one of the most effective multi-author works that I have encountered in the earth sciences. □

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Instruments of change

Alan Braithwaite

Microcomputers and Laboratory Instrumentation.

By David J. Malcolm-Lawes.

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MOST scientists and technologists are now faced with the challenge of the microprocessor chip. It is present in all types of instrumentation, to control the mechanics and optimize parameters, and also to collect and process data. It is still possible to lead the quiet life of an alchemist, but the march of progress means that sooner or later almost everyone in a laboratory will have to wrestle with a new language—the language of the computer—and with sophisticated instruments employing arrays of chips.

Programming languages are not too difficult to learn. They use an understandable syntax, and there are numerous books on the topic. The hardware presents more of a problem but, surprisingly, there are few accounts of the subject as it applies to scientific instrumentation and intended for the practising scientist. David Malcolm-Lawes has written such a text. It sets out to present in clear, understandable terms the overall concept of microcomputer systems, microprocessors and various logic chips incorporated into digital and interfacing circuitry. Further, many computers are used for collection of data from detectors

and transducers, and also to control instrument functions, switches, relays, heaters and so on, and these principles too are explained both in general terms and in more detail, including the logic required to buffer and interface digital signal buses and interconnect equipment. For the more enterprising readers there is also a chapter on system design concepts and the construction of interfaces and microcomputer equipment.

It is quite possible to read the book selectively to obtain an overview, but the main purpose is to cover all the necessary background concepts relating to the nature and handling of instrument and transducer signals, microcomputer systems and interfacing concepts. Overall, the writing reflects the teaching experience of the author, as does the inclusion of a large number of diagrams to supplement the text—in this subject in particular, a picture is indeed worth a thousand words.

The net result is a well-presented, readable book which provides a sound introduction to microcomputers in the laboratory and also to the principles and concepts of microprocessor systems and interfacing. Scientists and technologists seeking to get to grips with new technological developments, and students for whom laboratory instrumentation is part of their course, will find it very helpful. My only plea is that the publishers should consider issuing a paperback edition; I think they would find it worth their while. □

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