

BOOK REVIEWS

MAGNETOSTRATIGRAPHY. By E. A. Hailwood, Geological Society, London, 1989. Special Report No. 19, 84 pp., £17.50.

The Geological Society, London, has over the years brought out a number of Special Reports, mostly dealing with the correlation of the various Systems throughout the British Isles. This latest report, however, should be of interest to earth scientists in India.

It has for long been known that rocks carry a weak magnetism, a record of the nature of the geomagnetic field in the past, and that the earth has reversed the polarity of its field at irregular intervals throughout geological history. This has led to the development of a Magnetic Polarity Time Scale; and, as the author puts it: 'The subject has now taken its place alongside biostratigraphy and radiometric dating as one of the standard branches of stratigraphy'.

The magnetisation of a rock is defined as *normal* when the equivalent north palaeomagnetic pole lies close to the north geographic pole, and as *reverse* when it lies close to the south geographic pole. And as the earth has repeatedly reversed the polarity of its field, and as the polarity reversals occur simultaneously over the whole surface of the earth, they provide a potential basis for identifying true 'time planes' in geological sequences, as the author puts it.

The principal applications of magnetostratigraphy, therefore, lie in correlating and dating geological formations. This may be done by matching patterns of polarity reversals in different formations, the dating depending on matching the sequence with the appropriate part of the Geomagnetic Polarity Time Scale, such as a recognisable pattern of several long and short intervals of each polarity. According to the author, the pattern of geomagnetic polarity reversals is now reasonably well established, particularly from studies of marine magnetic anomalies. However, a satisfactory calibration of this pattern of reversals against the biostratigraphical and radiometric time scales has been achieved so far only for the Cenozoic and late Cretaceous, and particular attention is paid in the report to the polarity changes that occurred during this period. This is of relevance to the question of the age and duration of Deccan Trap volcanicity.

It was at the instance of the late Prof. P. M. S. Blackett that palaeomagnetic studies were started in the Tata Institute of Fundamental Research, Bombay, primarily to test the hypothesis of continental drift. The study was pursued by P. N. Sahasrabudhe, followed by P. C. Pal, R. N. Athavale, G. R. Anjaneyulu, V. S. Bhimasankaram, M. S. Bhalla, R. K. Verma, H. Wensink and C. T. Klootwijk, who were concerned mainly with the problem of the age, correlation and duration of Deccan Trap volcanicity. More recently, studies on the palaeomagnetism of the Deccan Trap flows in the Narmada region, and on the thick pile of flows at Kalsubai in Maharashtra have been carried out by the Department of Earth Sciences, I.I.T., Bombay. The earlier workers, examining the palaeomagnetism of the Deccan Trap flows of the Western Ghats, found that the greater part of this thick sequence showed a single reversed polarity, while the polarity time scale determined for the Maestrichtian-Palaecene period (given in Fig. 22 of the report) indicates that a polarity epoch during this period rarely lasted more than two million years, and generally less. It seems evident, therefore, that the eruption of these flows took

place over a relatively short period. This is in keeping with the field evidence, which suggests that the flows followed each other in rapid succession.

What we do not yet know is how many reversals took place during the total period of Deccan Trap volcanicity, since most of the palaeomagnetic determinations have been made on sequences of flows isolated from each other by erosion or by faulting.

Ideally, the geomagnetic polarity time-scale should be tied in with the isotopic age determinations. Unfortunately the K/Ar age determinations made on Deccan Trap flows appear to be unreliable, for various reasons; and the view previously held by some that Deccan Trap volcanicity extended from 102 million years ago to about 32 million years ago is now to be viewed with scepticism.

The report is an exhaustive treatise on magnetostratigraphy, and lists about 200 references. It covers processes of magnetisation in rocks, field and laboratory procedures, field stability tests, the presentation and analysis of palaeomagnetic data, and the development of the geomagnetic time-scale and its current status.

It is now time for palaeomagnetic research in India to be pursued more vigorously. As printed on the cover of the report: 'The report will have wide appeal and practical value to university students, research workers and economic geologists'.

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'THE STORY OF PETROLEUM'. By D. Chandra, Indian School of Mines, Dhanbad. Published by Dev Sahitya Kutir Pvt. Ltd., Calcutta, 39 pp. 1989. Price Rs. 16.

Oil has become a part of our existence and in spite of the commendable efforts by the Oil and Natural Gas Commission, self-sufficiency in this resource is still a long way off. Our country is obliged to spend no less than Rs. 8000 crores in importing this single commodity. This indicates the serious position in which we are in.

The average citizen in the country is poorly informed of this important resource and its effect on the country's economy. The efforts of Dr. Chandra of the Indian School of Mines in bringing this book on 'Story of Petroleum' is to be particularly commended in this context. He has tried to present within the short span of just thirty pages the different aspects of the petroleum industry in India from the stage of exploration to its production and distillation. Appropriate illustrations evenly spread out throughout the book add to the usefulness of the book.

The important lesson to be drawn is the imperative need for stopping wasteful practices in the use of petroleum products and the need to conserve this resource. While the book succeeds in informing the public of this important resource in a general way, there is need for a more detailed account of petroleum and natural gas resources of our country. We do trust the author will take steps to bring a more ambitious work aimed at furnishing a fuller and more detailed account of this important resource.