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Space Geology, An Introduction

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See table of contents

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make possible the identification of plate features in ancient terrains. The phenomenon of geochemical polarity - a progressive change in composition of volcanic rocks with increasing depth to the subduction zone - may even point up the dip direction of an ancient zone. Current theories explaining the origin of the various magma associations in relation to their tectonic setting are reviewed in the second part of the chapter.

The final chapter of the book on Crustal Origins and Growth is the most speculative and controversial for it reaches back to a time from which little incontrovertible evidence remains of either the nature of the early crust or of the tectonic regime in which it existed. For the Precambrian geologist it is also the most interesting. Some of the major problems outlined include: 1) the composition of the early Archean crust, whether mafic, sialic, or anorthositic; 2) the time of origin and rate of development of the continental crust, either rapid development early in earth history or slow development through geological time; and 3) the time of inception and period through which plate tectonics was operative. For the latter problem Condie reviews three proposals, continuous plate activity for at least the last 3.5 b.y., continuous activity from early earth history to the present except between 1.0 and 2.5 b.y. ago, and continuous activity for the past billion years only. Surprisingly he favours the second on the grounds that few subduction-type volcanic assemblages are known in the period 2.5 to 1.0 b.y. ago. I doubt if any of these proposals would be greatly favoured by most Canadian geologists who tend to regard the structural transition from Archean to Proterozoic as marking the major change in the earth's tectonic regimen, a change which could well coincide with the inception of plate tectonics.

As to supportive material, the book is well supplied with excellent illustrations (including a coloured 31 x 42 in. tectonic map of the world), numerous tables, an adequate bibliography, and suggestions for further readings at the end of each chapter. The figures for each chapter are collected together at the end of the chapter rather than scattered through the text, an arrangement I found slightly inconvenient but which might be an advantage for quick referencing. Conclusions given at the end of each chapter are also excellent summaries of the chapter's contents and should be particularly useful for students. My major criticism is that background material for some of the tables is very skimpy. Table 7.3 for example, on Average Compositions of Basalts and Andesites contains no information on sources, numbers of analyses averaged nor how material was selected and divided.

A number of typographical errors were noted but only two which refer to the wrong figures are of consequence.

To sum up, this book is an excellent, well-balanced summary of what are essentially the major achievements in the earth sciences in the last 10 to 15 years. Although many of us may feel reasonably knowledgeable about the theory of plate tectonics I suspect that many, like myself, will discover upon reading this book that our knowledge is actually rather spotty. This book brings it together in a way that we are unlikely to achieve in our devotion to the specialized literature of the journals. I would recommend the book as a general reference on plate tectonics for students and seasoned practioners alike. The price is modest by today's standards.

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Space Geology, An Introduction

By E. A. King
John Wiley and Sons, Inc., New York
349 p., 1977.
$16.95

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The application of geologic methods and insight to other bodies of the solar system is now a listy and vigourous offspring of the earth sciences, but as yet has made little impact on its parents While this is a sign of immaturity, it is also in part due to the small number of those who, having been involved, are willing to step off NASA's treadmill long enough to produce an authoritative synthesis of progress to date.

Prof. King, writing from a background in meteorites and as a former curator of Apollo mission samples, has made a response to this challenge. As he freely acknowledges, the choice of subject matter reflects his own interests rather than an attempt to make a balanced and exhaustive treatment of the entire field. His book is in effect an annotated bibliography of geologic topics which have developed or been brought into prominence by space explorations. In that sense the coverage approaches the comprehensiveness claimed on the dust jacket.

Approximately equal space is devoted to four topics: meteorites and tektites; impact structures and shock metamorphism; the Moon; Mars and other members of the Solar System. The author is most clearly at home when discussing the mineralogy and petrography of extraterrestrial materials and this predilection is immediately apparent in the abundant illustrations, almost half of which are photomicrographs. Otherwise the text comprises brief histories of each topic followed by short, flat reports on a miscellany of matters. Only in the chapter on the Moon, where the author is guided by the comprehensive coverage of the annual Lunar Science conferences at Houston, is completeness approached. Many of the stimulating scientific debates that have been held are mentioned but rarely does the reader get more than a superficial glimpse of their content. The lack of an overall philosophy to the book is pointed up by the brief and totally inadequate final chapter on comparative planetology.

The work is aimed at advanced undergraduate or graduate students, but it rarely makes demands beyond the compass of the beginning undergraduate. This is achieved in part by the provision of an unusually complete glossary which gives definitions not only of special inventions such as "astrobleme" and "mascon" but also of standard geological and astronomical terms Unfortunately the author has chosen not to follow such standards as the AGI Glossary of Geology, but has provided his own definitions, some of which, as he ackowledges, lack rigour, and, in some cases, accuracy (see, for example, "pseudotachylite" and "tuff"). This impression carries over into the text.

Thus we are told that the energy of natural hyper-velocity impact is "quite great" (p. 82), and the amount of heat generated is "fairly large" (p. 91). Pyroxferroite is said to be abundant (p. 179) whereas it is only a minor accessory of some lunar basalts, earth-crossing Apollo asteroids are said to have diameters of the order of half a kilometre (p. 281), whereas the average is two kilometres, and on p. 301, we learn that the lithosphere of Mercury, possibly 600 km thick, is thin compared with that of the Earth (!), apparently a confusion of composition with physical state. Students are given some guidance into such matters as Rankine-Hugoniot equations, but are virtually on their own when confronted with pseudoternary liquidus diagrams.

The book is of moderate size and is handsomely printed on high gloss paper. Its expert design makes the most of the material presented, with excellent tones to the numerous photographs and generally clear line drawings. Typographical errors are rare. With half of the space devoted to illustrations and tables, and another 15 per cent to lists of references, the book can be said to achieve the author's modest aim of providing an entrée to the subject's vast literature, at least to 1974. However, it is representative of, rather than a solution to, the problem of conveying to the student and professional scientific communities an appreciation not only of the technological achievements but also of the basic scientific results of space exploration.

MS received June 8, 1977.

The Billion Barrel Oil Swindle

By L. A. Sikabonyi
Exposition Press, Hicksville, New York, 256 p., 1976.
$8.50

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The most extraordinary statement in this novel of the oil industry appears in the "Author's Note" where he says "Neither the references to localities in Canada or Alberta, nor any of the events and persons described in this book reflect any actual incidents or portray any real person . . ." If ever there was a *roman à clef* this would seem to be it. Indeed the fictional names of the companies and people involved are so transparent as to make one wonder why they were altered at all. But what relation the story has to the *cause célèbre* involving the author and certain oil companies a few years ago we cannot tell, for, in fact as in fiction, the matter was settled out of court.

The novel is about a geological consultant who has an idea for an oil trap beneath land controlled by a major oil company. The major company has lost interest in this land and so their land man makes a deal with the consultant to 'peddle' the acreage for them. The consultant is allegedly cheated out of his fee and royalty when a firm which he is trying to interest in the prospect takes his information and goes over his head to deal directly with the major. The exploratory well drilled on the prospect results in an important discovery and the consultant sues for his share.

The plot hinges on the interpretation of the oral agreement that the consultant had with major. Nothing was ever written down. And although, in the oil industry, multi-million dollar deals are quite often settled on a handshake, this usually takes place within a group of business executives between whom mutual trust has been built up through the years.

Many years ago, when I was a farmer, this is the way deals were made in the marketplace and it has always struck me as rather ironic that it is in the "villainous" oil business that the practice lingers on when elsewhere distrust and lawyers now hold sway.

But there are limits even to the camaraderie of the oil patch: and it frankly strains one's credulity to suppose that a major company would give a two-man consulting firm an exclusive right to peddle its land or that it would not simultaneously have offered it to any company known to have exploration money available. So perhaps we should take literally the author's claim to be writing a work of fiction.

The main action of the novel takes place in a room at the courthouse where the examination for discovery is being held. The consultant is vindicated, but has to settle out of court for a sum barely enough to pay his legal fees. His business is boycotted by the industry which sees him as a trouble-maker and his attempt to claim his share of the loot in a business dominated by corporate giants results in personal disaster.

Intertwined with this story are episodes outside the courtroom where naive questioners are given simple lectures on the technicalities of the oil industry. And there are conversations in the business clubs of Calgary where the domination of the major integrated companies is condemned and an alternative structure for the industry advocated by the author through the mouths of various oil men. Sikabonyi knows his oil industry and the book is free from those technical *gaffes* which so often mar books about the business. Alas, in spite of "ghostly" help, it is no work of art. There are too many didactic passages and the only woman who appears as a person rather than an anonymous, but "curvaceous", ministrant is soon turned into the wide-eyed and passive recipient of information about the land tenure system in Alberta.

But I must say I found the book held my attention to the end. Perhaps it is the fascination of reading about one's own business - a sort of narcissism like that which produces all those movies about "show-biz."

MS received August 30, 1977.

Meadow Lake Geolog: The Land—Past and Present

By E. A. Christiansen, C. A. Padbury and R. J. Long
Museums Branch
Dept. Tourism and Renewable Resources and Saskatchewan Research Council,
Interpretive Rept. No. 1, 50 p. 1975.
$2.00

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Meadow Lake Geolog is in the nature of a primer of Quaternary Geology for the