

effort that has obviously gone into the seismic zoning of the USSR.

Despite its length, frequent repetitiveness and sometimes difficult reading the book must be recommended to those involved in any aspect of seismic risk analysis.

MS received April 21, 1978

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## Geology in the Urban Environment

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By R. O. Utgard, G. D. McKenzie, and D. Foley  
*Burgess Publishing Company, Minneapolis, Minnesota, 355p., 1978*  
 \$9.95

Reviewed by P. F. Karrow  
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This book is an exception to my general distaste for collections of papers. Although my first reaction was "Oh, not another one!", on looking through it I found I was excited and fascinated by the papers it contained.

The authors state that the book "is designed as a basic text for courses in geology of the urban environment. It might also be used as a supplementary text in environmental geology courses." I suspect courses in urban geology constitute a very small market, as desirable as such courses may be in theory, and I would expect the use as supplementary reading in environmental geology would predominate. It is not a textbook according to my conception, which involves synthesis and generalization of knowledge on a particular subject. Instead it is a collection of readings and case histories which can serve as useful illustrations of geological problems affecting urban areas. Most papers date from the 70s, some papers have been reduced substantially in length by the authors of the book.

After a short foreword by Robert F. Legget, a recognized authority in the field of urban geology, and a short preface by the authors acknowledging U.S. Geological Survey publications as a major source, the book is divided into seven topical parts. Each part begins

with a brief summary by the compilers of the collection.

Part one, introduction, contains four papers by McGill, Legget, Withington, and Loudermilk describing the role and need for urban geology, urban geological and engineering maps, the Washington experience, and some examples from the Old World.

Part two, geologic hazards in the urban environment, contains nine papers dealing with such topics as hydrology and floods, sediment problems, landslides and subsidence, and earthquakes.

Part three, engineering aspects of land use, comprises five papers on swelling clays, the urban water table, landslides, Chicago flood control, and permafrost problems.

Part four, resource availability in the urban environment, contains four papers on water resources, mineral resources, and use of mines for underground space, this last being one of my favourites in the book.

Part five, environmental considerations of urban resource development, contains three papers on waste disposal, lake management, and strip mine reclamation.

Part six deals with interpretation and presentation of geologic data on the urban environment, and contains four papers on San Francisco, engineering geology maps, carbonate terrain problems, and data systems.

The last part, on utilization of geologic information in regional planning, comprises two papers on general recommendations and the California master plan.

The book concludes with a glossary and four appendices, geologic time chart, conversion factors, surface water criteria for public water supplies, and a listing of state and provincial sources of information (mainly geological surveys).

As can be inferred from the above summary of contents, some overlap in topics is present, both because topics interrelate and because the original papers were not written for the context in which they have been placed.

While I would not agree with its designation as a text book, I believe this book should provide interesting and instructive reading for students of a wide variety, but particularly those in geography, planning, geology, and civil engineering. I should also interest

professionals in those fields as a good sampling of the recent experience in urban geology. I have ordered several copies for the supplementary reading shelves in our university book store.

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## Photographic Atlas of the Mid-Atlantic Ridge Rift Valley

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By Robert D. Ballard and James G. Moore  
*Springer-Verlag, New York, 114 p., 1977.*  
 US \$19.80

Reviewed by James M. Hall and William A. Kay  
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By the end of the 1960s study of deep ocean geology and geophysics from surface ships had given rise to the attractive plate tectonic model for the lithosphere. However, testing and refining the model by direct examination of critical areas, such as the median valleys of spreading ridges, was held up by the poor resolution of surface ship techniques. For example, attempts to map the topography of rift valleys produced a series of interfering hyperbolae, while dredge-haul rock samples could neither be located in space with much confidence, nor be related to known detailed topography.

Various means of overcoming this problem of lack of resolution came into use in the early 1970s. These include observation and sampling of the ocean floor from submersibles or by deep-tow devices, and sampling of ocean crust by drilling rather than dredging.

The book being reviewed gives some of the first results of observation from submersibles, with supporting photography from towed camera systems. The area covered is the rift valley of the Mid-Atlantic Ridge at 37°N, the FAMOUS (Franco-American Mid-Ocean Undersea Study) area. The book is essentially a collection of photographs which comprise most of the 183 illustrations. Most were taken from within the submersible ALVIN.

The philosophy behind the book is one with which we have great sympathy. It allows the reader to have a superb visual impression of what the surface of the Earth's crust looks like in an area where new crustal formation is in progress. Photographs give the reader the opportunity to make up his own mind about the meaning of features, and are also an efficient way of transmitting information compared with the written word.

The photographs are formally divided into two groups, those illustrating submarine volcanic products and a second group illustrating faults and related tectonic features. There is in fact a third group hidden at the end of submarine volcanic products. This set of 17 drawings and photographs are of features of pillow crust. What is impressive here is the manner by which lava tubes elongate. They often do so by annular splitting of the solid surface of the tube followed by the broken halves being forced apart by new material. This new material is usually added symmetrically at a narrow central zone, at the location of the original annular crack. The form of the surface of the new part of the tube depends on the addition rate, with much minor cracking at slow rates (photographs 110 and 111, for example). The whole process mimics in so many ways on a small scale the features of the surface of a Mid-Ocean Ridge.

The section on faults and related tectonic features is fascinating in that a progressive evolution in fine scale tectonic style can be traced from the axis of the rift valley, where new material is added to the walls. Fissures exactly of the Icelandic gja ('gyow') type are the first tectonic manifestations. (Nowhere is this word written phonetically to help the reader who is ignorant of Icelandic.) With distance from the volcanic axis of the valley the fissures show vertical relative movement of their walls, graben structures between adjacent fissures, and sometime rotations of adjacent blocks. One of the surprises of the photographs of open fissures is to find that fissures generally propagate by cracking pillows apart rather than following pillow margins (for example, photograph 148).

In summary this is a most valuable (but not very expensive!) book for all students of the ocean floor and indeed for all geologists who worry about how new crustal plate forms on the scale of

normal surface geological mapping, rather than seen from a distant geophysical viewpoint.

MS received May 29, 1978

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## Chemical Evolution of the Early Precambrian

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Edited by Cyril Ponnampereuma  
*Academic Press Inc., New York,  
San Francisco, London,  
221 p., 1977  
US \$13.50/£9.60*

Reviewed by H. J. Hofmann  
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This volume contains 22 papers presented by geologists, paleontologists, biologists, and chemists at the second colloquium organized in 1975 by Ponnampereuma at the Laboratory of Chemical Evolution, University of Maryland. The symposium focussed on the questions "When did life begin?" and "Is there any evidence for prebiotic processes on the earth?".

The title of the book is somewhat of a misnomer, inasmuch as the emphasis is decidedly on biospheric rather than lithospheric evolution, and the topics discussed are not restricted to the Early Precambrian (= Archean of Canadian usage). In fact, only about one third of the papers deal directly and specifically with phenomena and events of this interval; about another third concern general problems that span the whole of the geologic record; the remainder are on post-Archean subjects, chiefly Proterozoic. The diverse topics discussed include: origin of the atmosphere, early Precambrian weathering and sedimentation, Archean geochronology, continental evolution of sial throughout geologic time, regional geology and stromatolites of the Slave province, early Archean carbon, condensed phosphates from abiotic systems in nature, organic geochemistry of Permian hydrocarbons from Brazil, stable isotopes of hydrogen in Precambrian organic matter, terrestrial oxygen evolution, Archean and Proterozoic microfossils and stromato-

lites, protection of blue-green algae against UV, modern procaryotes and Precambrian analogues, criteria for biogenicity, synthetic organic microstructures as models for early protobionts, artificial silicification of microorganisms, synthetic organic microstructures, late appearance of metazoans, metaphytes and fungi, and procaryotic biochemistry.

The papers are for the most part, short summaries (some with abstracts, some without, some merely abstracts) of research published in more detail elsewhere during the last three years. The reader wishing further data will have to consult these more comprehensive articles. By bringing the material together in one volume the editor and publishers have provided a compendium for geologists and graduate students who want a glimpse of recent developments in Precambrian biogeology. The book has a hard cover and is very reasonably priced, in part no doubt due to printing by offset from type-written copy. References are given at the end of each paper in abbreviated form, without title; they could have been grouped in a bibliography at the end of the book, citing full titles. There is a detailed table of contents, and a useful subject index. The editing is uneven, and many minor typographical errors remain, such as the reference to very old rocks older than 100 million years (instead of 3100 m.y.) on page v, and cyanophyte filaments 10 m in diameter (instead of 10 $\mu$ m) on p. 182. A more serious flaw is the lack of a synthesis or summary; it would have been helpful if the editor had included a chapter summarizing the main conclusions and their relevance to the two main questions to which the colloquium addressed itself. It is left to the reader to organize the diverse facts and ideas presented.

The book gives a useful perspective for geologists and paleontologists by presenting, under one cover, the diversity of views and approaches followed by active specialist workers in attacking the problems of Precambrian biospheric evolution.

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