Cooke and Warren's book is larger in scope than Glennie's but considerably more restricted than Petrov's, and less descriptive in character. For this reason, it is more satisfying than the Russian work as a general introduction to physical processes in deserts. The main value of Petrov's book, apart from the wealth of (often very interesting) descriptive detail would seem to be as a summary of Russian research that, judging from the other two works, has remained largely unknown in the west. Also, Petrov seems to have personal knowledge of deserts on several continents and an encyclopedic familiarity with the world literature, so that his (rather rare) generalizations carry considerable authority.

Petrov stresses that modern deserts have been formed by desiccation since much wetter conditions in the Pleistocene: on the other hand, saline crusts found in many modern deserts are relict from even earlier arid climates. Major accumulations of wind-blown sand are generally located within ancient alluvial (fluviatile, deltaic and lacustrine) plains and derived from fluvial sands: examples include most of the sandy deserts of Middle Asia, as well as most of those in the Sahara, Arabia and Australia. Thickness of wind blown sands is not generally larger than 100 m. The grain size is generally fine to very fine sand, and the sands lack a fine silt to clay fraction. Mineralogy is variable, but tends to be quartzoze. with a lower content of mica and unstable minerals than in the source materials. (Petrov presents several pages of tables of mineralogical and chemical data for sands from several deserts - not all of the data seems compatible with generalizations made in the text). Desert sands take on a yellow or reddish colour from thin surface coating of ferric oxides.

Petrov gives an interesting discussion of earlier attempts to classify eolian bedforms, and presents a new classification (based on an earlier Russian work by Fedorovich) together with a selection of illustrative airphotos. Basically the main desert forms are barchans, "barchan chains" (transverse dunes) of simple and complex types, longitudinal dunes, and complex pyramidal dunes. Petrov recognizes a three tier heirarchy of transverse bedforms: ripples, simple chains (of the order of 10 m high), and complex ridges (up to 100 m high with smaller chains superimposed). For longitudinal dunes, he favours the theory, most thoroughly worked out by Hanna, that they are formed by secondary spiral currents, with dimensions determined by the thickness of the tradewind boundary layer (as this is generally 1 km, the spacing of the ridges is about 2 km). The internal structures of dunes are not treated in any detail, and one has the impression that little Russian work has been done on this topic.

A term that recurs frequently in the text is *solonchak* which means a desert soil with concentrated chloride pore waters, or an area where such soils predominate - it is the Russian equivalent of *sabkha*. The interior drainage of desert basins results in the accumulation in continental lowlands of soluble salts, and substantial deposits of salt and gypsum may result. For example, the largest solonchack in Central Asia has an area of about 1,600 km^2 (a lake, shallower than 2 m, occupies about 20% of this area) and is underlain by almost 60 m of halite and gypsum, with sand and mud interbeds. Similar inland sabkhas are described by Glennie from Arabia. It seems strange that few, if any, comparable non-marine evaporites have yet been described from the geological record.

In summary, Petrov's book may be recommended as a very comprehensive descriptive work on the world's deserts. Its style leans towards "natural history" and differs from the analytical, process-oriented approach fashionable at present among western geomorphologists. It is a valuable supplement to the book by Cooke and Warren. Unfortunately the price is so high as to virtually eliminate personal purchase. For the price, one might also have hoped for a general index, besides the geographical and plant indexes that are provided.

MS received July 5, 1977

Plate Tectonics and Crustal Evolution

By Kent C. Condie
Pergamon Press, 288 p., 1976.
$22.50

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This is a textbook aimed at the graduate or senior undergraduate level but very little is taken for granted in the way of disciplinarian pre-requisites and I believe almost anyone with a basic grounding in science could read it with understanding. Nearly half the book is devoted to the groundwork of the plate tectonics theory: basic information about the earth, methods of geophysics and geochronology, petrogenic theory, and ancillary geological concepts. These are then utilized in the remainder of the book to develop the theory of plate tectonics, to trace its effect on global geography through time, and to speculate on its role in the development of the earth's crust. The breadth of the treatment is considerable, touching as it must some aspect of nearly all earth science disciplines but the author has generally handled the diverse elements with skill, providing enough information in each case to understand the principal and significance of the evidence and blending them all into a coherent account of plate tectonics and crustal history.

For those of us whose interests are in the distant geological past, the aspects of plate tectonics of primary concern are those which can be recognized in the geological column and interpreted in terms of ancient plate geography and movement. In this regard the chapter on Magma Associations is of special interest. Magma types are reviewed in terms of plate geography; their location at plate margins or in plate interiors. Magma associations at plate margins include those erupted at subduction zones and in oceanic rifts whereas the intraplate magmas are those of marginal seas and oceanic basins and of continental rift zones. Each location is marked by volcanic rocks of distinctive geochemical character which should

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.

MS received August 24, 1977.

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.