volcanism, crustal structure, trenches, and fracture zones without referring to the most far-reaching concept yet devised to explain these features. The East Pacific Rise is not only ignored as a spreading center; it is not even included in a list of the major structural features of the Pacific Ocean.

It is difficult, however, to dwell on the faults of a book as carefully prepared, lucidly written, and beautifully illustrated as this one is. It will certainly be well received by geologists and nongeologists alike.

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The Earth and Beyond

The Atlas of the Universe. PATRICK MOORE. Rand McNally, New York, 1970. 272 pp. $35.

This comprehensive, communicative, and beautifully produced compendium of pictorial astronomy contains much accurate information. A foreword by Bernard Lovell, an epilogue by Thomas Paine, and authorship by Patrick Moore, who is one of the best-known popular writers and broadcasters of astronomy, provide it with prestigious testimonials.

The large size of the pages, 10½ by 14½ inches, allows for a flexible layout. A combination of large and small, full-color and two-color photographs, diagrams, and drawings, with explanatory text in layman's language, is assembled on each double-page spread; this provides an easily assimilated survey of present-day astronomical and geological knowledge. Many maps are provided, and at the end there are a glossary, a beginner's guide to the heavens, and a good index. The sectional arrangement and choice of topics are sensible and helpful. The order is from the known to the unknown, outward from the earth, and before tackling any of the scientific results we have a look at the tools (many types of telescopes and accessories) and the behavior of light; concepts and methods are discussed, and a good deal of the history of astronomy is surveyed. The section that follows this introduction provides a short course on the earth as a planet and includes as illustration views from the moon and from artificial satellites, comparison of these with maps, explanations of weather phenomena, geological ideas, and life on earth. Next come several sections on the moon, the solar system, and the stars, the last named being too modestly titled as it actually includes everything outside the solar system.

The *Atlas* is as up-to-date as it could be, just missing the new International Astronomical Union list of named far-side lunar features but including descriptions of quasars, pulsars, and a number of strange galaxies.

The large-scale organization is good. In detail, I find it less so, perhaps because the quantization of the contents (one subject or sub-subject to a double page or a number of double pages) is too rigid. To me, an occasional treatment seems stretched to fit the layout while a few others inevitably seem compressed for the same reason. The subjects of meteorites, meteors, and tektites (one double page for all these dubiously related objects), and infrared and ultraviolet astronomy outside the solar system (practically nothing) appear to have been shortchanged, but there is truly a wealth of information elsewhere, the language is simple and well chosen, and the *Atlas* is a joy to look at.

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Predicting Floods

Hydrological Forecasting. Proceedings of a WMO/UNESCO symposium, Surfers' Paradise, Queensland, Australia, Nov.–Dec. 1967. World Meteorological Organization, Geneva, 1969 (U.S. distributor, UNIPUB, New York). xvi, 328 pp., illus. Paper, $21. WMO Technical Note No. 92.

The theme of this symposium was the "forecasting, especially for shorter time-intervals, of rainfall floods." The proceedings should present a state-of-the-art assessment of forecasting, and the papers should be judged both on their individual merit and on their integrated effect. Unfortunately, two major papers have been published in one-page summaries, and one of these is among the three introductory overview papers. One of the two published overview papers, by Philip, gives a good, brief summary of knowledge of the microprocesses of accretion to and depletions from soil moisture; the other, by Popov, covers surface routing of flows by both hydraulic (equations of flow) and hydrologic (unit hydrograph) methods.

The remainder of the volume is divided into sections on the forecasting of precipitation (4 papers), data (4 papers), forecasting techniques (16 papers), and operational aspects (4 papers). The precipitation papers are descriptive, and indicate the major problems of a lack of adequate models for predicting precipitation, even on a short time scale, for use in streamflow forecasting. Perhaps the best paper on precipitation is that by Alexander, "Mathematical models of area rainfall," contained in the data section, which outlines the problems in the use of rainfall in modeling runoff. The papers on forecasting techniques give an excellent coverage of present practices in various parts of the world. Anyone planning to develop or choose a forecasting model would profit from reading these papers and comparing and assessing models, but only one (that by Riggs and Hanson) discusses the probability aspects of forecasting.

Barakov presents an application of the method developed by Popov to handle the partial contributing area problem, which has been discussed extensively by the Tennessee Valley Authority group in the United States. Denisov presents an approach to modeling snowmelt runoff, with data requirements of temperature, humidity, and precipitation. Kutchment presents in outline form the Russian approach to unit hydrograph analysis through the theory of incorrect problems. This approach is being introduced extensively in Russian hydrologic literature. The problem is analogous to that attacked in the paper Kutchment cites by Eagleson, in that errors in data may produce unstable solutions to the convolution integral. Each event produces a different solution, so that the instantaneous unit hydrograph (IUH) is not unique. The theory of incorrect problems provides a tool for finding an optimal solution for the IUH. These papers, plus others included in the proceedings, give a good cross section of Russian developments in mathematical analysis of hydrologic problems.

Nash and Sutcliffe present a general approach to parametric model building along the lines presented more completely in a series by Nash and others in *Journal of Hydrology*. Crawford presents the use of the Stanford Watershed Model IV as a case study in the use of conceptual models for fore-