

# High-Pressure Research: Applications in Geophysics

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## High-Pressure Research: Applications in Geophysics

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Edited by Murli H. Manghnani and Syun-iti Akimoto  
*Academic Press, Inc.*, 642 p., 1977.  
 \$29.50

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Over 160 years ago, Sir James Hall published the results of his experiments on basalts which struck a decisive blow to the Neptunist's view and supported James Hutton's Plutonists. As this book illustrates, high-pressure experiments contributing to our understanding of the earth have come a long way since Hall's experiments at about 270 bars and 1000°C. Using a variety of ingenious techniques, many of which are described in this book, earth scientists can now experiment at pressures in excess of 1 Mbar (equivalent to depths well over one-half of the distance to the earth's centre) and temperatures greater than 2000°C. The results of such high-pressure experiments should be of fundamental interest to a wide spectrum of earth scientists particularly geophysicists, geochemists and petrologists.

*High-Pressure Research: Applications in Geophysics* is a collection of 42 papers and abstracts mainly by American and Japanese scientists presented at a seminar held in Honolulu in 1976. The book is divided into four sections. Geophysics and geochemistry of the Crust and Upper Mantle: Phase transitions related to the Earth's deep interior: Equations of state and shock wave experiments; and Instrumentation, pressure calibration, and standardization. The majority of papers present new data or new techniques; the remainder are valuable review papers which will be of interest both to scientists involved in high-pressure research as well as to those not directly involved in this field. This reviewer was impressed by the techniques involved in generating

extremely high pressures and high temperatures, particularly the diamond anvil pressure cell and laser heating system, and by the use of holographic interferometry to determine deformation in granite under high pressures.

Unfortunately Manghnani and Akimoto's book has a number of faults that potential buyers should be aware of. One is its misleading title – "Applications in Geophysics". Since approximately one-third of the book (the first section) is directly applicable to igneous petrology and plate tectonic processes the potential buyer in petrology and geochemistry should not be put off by the title. Another fault is the lack of cohesion in the book. Although this is a common failing in books consisting of a series of papers by authors of diverse specialities, it could have been avoided by a rearrangement of papers within each section and by a brief "overview-type" chapter at the beginning of each section which would have given readers, unfamiliar with the problems dealt with in the sections, an idea of their significance as well as providing them with a connecting link between the sections.

Although typographical errors and omissions in this book are minimal, they are annoying since they tend to occur frequently in certain papers. The book is well illustrated by line drawings and photographs, and the text, reproduced by a rapid manuscript reproduction process, is clear. References are given at the end of each chapter and range from papers published in 1977 to a reference to William Shakespeare's "Othello" published in 1622! An author index would have been valuable.

In this reviewer's opinion, this book is unsuitable as a textbook for anything but advanced graduate courses in earth sciences and because of this will probably have a limited sale, confined to specialists in high-pressure research. This is a pity since it contains many contributions which should influence earth scientists both now and in the immediate future.

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## A Structural Stratigraphic and Petrologic Study of Anorthosites, Eclogites and Ultramafic Rocks and Their Country Rocks, Tafjord Area, Western Norway

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By H.K. Brueckner  
*Norges Geologiske Undersokelse*, 53 p., 1977.  
 U.S. \$10.00

Reviewed by Jacques Martignole  
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This monograph, which is the published version of an unpublished Ph.D. Thesis dated 1968, is based on a field study which covers an area of about 300 km<sup>2</sup> in the central gneiss of south-western Norway. The report consists of two parts: the first part is devoted to gneisses and metasediments, the second part contains an account of stratigraphy, structure and petrology of the various lithologies.

The stratigraphy, based on careful mapping leads to a two-fold subdivision of Precambrian gneisses and metasediments into the Fetvatn gneisses and the Vikvatn sequence. The Vitvatn sequence has been subdivided into three groups which clearly outline major structures on the geological map. The basal group (Oyen Group) is subdivided into three formations. Unfortunately these formations do not appear on the map and one wonders whether this is due to a scale problem or to the questionable status of these formations.

The most striking feature of the Oyen Group (and also the overlying Ovtse Rodal Group) is the occurrence of eclogites and ultramafic boudins and of stratiform anorthosites that are mapped as thin bands several km in length. These two groups are overlain by the quartzitic Svartega Group tentatively attributed to the Eo-Cambrian.

The structural framework on which map interpretation and stratigraphy are based follows the techniques of