

Werk

Jahr: 1986

Kollektion: fid.geo

Signatur: 8 Z NAT 2148:60

Digitalisiert: Niedersächsische Staats- und Universitätsbibliothek Göttingen

Werk Id: PPN1015067948_0060

PURL: http://resolver.sub.uni-goettingen.de/purl?PPN1015067948_0060

LOG Id: LOG_0023

LOG Titel: Book reviews

LOG Typ: section

Übergeordnetes Werk

Werk Id: PPN1015067948

PURL: <http://resolver.sub.uni-goettingen.de/purl?PPN1015067948>

OPAC: <http://opac.sub.uni-goettingen.de/DB=1/PPN?PPN=1015067948>

Terms and Conditions

The Goettingen State and University Library provides access to digitized documents strictly for noncommercial educational, research and private purposes and makes no warranty with regard to their use for other purposes. Some of our collections are protected by copyright. Publication and/or broadcast in any form (including electronic) requires prior written permission from the Goettingen State- and University Library.

Each copy of any part of this document must contain there Terms and Conditions. With the usage of the library's online system to access or download a digitized document you accept the Terms and Conditions.

Reproductions of material on the web site may not be made for or donated to other repositories, nor may be further reproduced without written permission from the Goettingen State- and University Library.

For reproduction requests and permissions, please contact us. If citing materials, please give proper attribution of the source.

Contact

Niedersächsische Staats- und Universitätsbibliothek Göttingen
Georg-August-Universität Göttingen
Platz der Göttinger Sieben 1
37073 Göttingen
Germany
Email: gdz@sub.uni-goettingen.de

Book reviews

Bakun-Czubarow, N., Guterch, A., Leliwa-Kopystynski, J., Maj, S., Teisseyre, R.: Constitution of the Earth's Interior. Leliwa-Kopystynski, J., Teisseyre, R. (eds.). Elsevier, Amsterdam, Oxford, New York, PWN-Polish Scientific Publishers, Warszawa, 368 p., DM 200,— approx., 1984.

This is the first volume of a series of books on “Physics and Evolution of the Earth's Interior”, edited by R. Teisseyre. In this volume the basic physical laws are presented which govern the state and the properties of matter under the conditions of the earth's interior. Their application to data of geophysical fields leads to models on the physical and chemical constitution of the earth currently under discussion. It was probably a good idea of the editors to invite several of their colleagues to contribute with rather comprehensive, critically and mostly excellently written reviews on particular aspects of the broad field covered by this book. In the eight chapters of this well-organized book the following topics are treated: thermodynamic equations of state based on continuum and quantum physics and geophysical equations of state related to seismic wave velocities; density models of the earth's interior with a brief account also of models of the interior of moon and planets; basic formulations of viscous material behaviour and description of the classical mechanisms of steady-state creep; effective viscosities of the earth's mantle as derived from isostatic uplift; quality factor Q and a frequency-independent Q model of the earth; heat flow, heat production, the mechanisms of heat conductivity and of electric conductivity in the earth; estimates of the temperature-depth distribution based on various kinds of evidence; general features of the physical and petrological structure of the earth's crust and upper mantle mainly based on deep seismic sounding; thermodynamics and kinetics of phase transformations and phase transition boundaries in the presence of large-scale motion in the mantle. This particularly interesting chapter contains many original contributions by the author Leliwa-Kopystynski; mineralogical-petrological considerations on possible and hypothetical phase transformations within the earth's mantle. The book closes with an overview on models of the chemical and mineralogical composition of the mantle.

This book is the first comprehensive modern presentation of the physics of the earth's interior and will certainly be welcomed not only by geophysicists but also by petrologists interested in physical aspects. Depending on author and subject, it has in some chapters almost the character of a textbook for advanced students and in others more the character of a critical compilation of relevant information. It is certainly of a particular advantage that the authors are acquainted both with the western and the eastern literature. Publications up to the end of the 1970s have been evaluated in this book. This puts some limit to the actuality of the otherwise very valuable and informative work.

H. Berckhemer

Schöve, D.J. (ed.): Sunspot Cycles. Hutchinson Ross Publishing Company, Stroudsburg, PA, 397 p., 1983.

The book does not deal with the nature of sunspots nor with their presumed causes. It is devoted exclusively to the well-known feature that their numbers and some accompanying phenomena are waxing and waning in a period of about 11 years, the sunspot cycle. The book, as a matter of fact, is a collection of 40 articles or extracts of articles written by 21 authors of the present and the past century. After a general introduction by the editor the papers are combined in seven parts, each preceded by comments by the editor to the individual articles.

In the introduction, sources of data of past sunspot cycles are summarized: notably telescope observations, auroral displays, radio carbon content, tree rings, barometric pressure and temperature indices. In Part I: Early sunspots, pretelescopic records of sunspots are quoted going back as far as some centuries B.C. in China and to 1600 A.D. in Europe. In Part II: The eleven-year cycle, the discovery of the sunspot cycle is illustrated by quoting classical papers. Tables of observations by Schwabe, by Wolf and the famous Maunder diagram are reproduced together with excerpts from the original papers. In Part III: Early aurorae, observations of aurorae going back as far as 500 B.C. in China and to 400 A.D. in north-west Europe are compiled. Needless to say, the observations are scattered and in many events the interpretation is difficult. A graphical presentation at the end of the chapter summarizes the observations between 701 B.C. and 2000 A.D. In Part IV: Synthesis, an attempt is made to establish a full series of sunspot cycles combining all available observations of sunspots as well as aurorae. The prolonged sunspot minimum 1645–1715 (Maunder Minimum) and its implications are presented at length. The variation of the period of the individual cycles, the mean value and the deviations are discussed as well as the reliability of the predictions. The hazards of an unreliable forecast are demonstrated by the demise of Skylab in July 1979.

Part V: Longer cycles, deals with the 22-year, 80-year and 200-year cycle. The 22-year cycle shows up very distinctly in the reversal of the magnetic polarity of the preceding spot in bipolar groups. The existence of a 80-year and a 200-year cycle is still controversial. Part VI: Sunspots in history and their effect on climate, is devoted to problems which are rather controversial among experts as well as in common live, the correlation of economical and meteorological cycles with those of sunspots. A period of 10.3 years may be detected in the succession of commercial crises during the 18th and 19th century connected perhaps with a similar variation of crops in tropical countries. Indications of periods in barometric pressure and climatic fluctuations are present in the weather records of some regions. The correlation between tree rings and meteorological parameters enables an extension of the series to times when no meteorological records are available. The well-established biennial oscillation (2.2 years) in meteorological phenomena

is about one-fifth of the sunspot cycle. Also, a period of 22 years and of 80 years (Hale period) in climate has allegedly been found. All these investigations suffer apparently from the scarcity of reliable, long-time observations. In Part VII: Varve and geological cycles, the results of efforts to derive climatic variations from varves back to 14000 B.C. are presented.

The editor summarizes the content of the book as follows: "Sunspot cycles averaging 11.1 years have been dated through the last 2000 years and we have learned something of the way in which they and several longer cycles affect our climate. We have found that within certain limits we can predict both sunspot activity and its climatological consequences", and later on ... "The papers selected explain the how but not the why of sunspot cycles – their cause remains an enigma".

The feelings in reading the book may be somewhat controversial: well-established correlations as well as rather vague presumptions are presented together. In any case, the book serves its purpose: to collect information which is scattered widely in time and space. The author citation index contains about 600 names. Reiterations are unavoidable in that kind of documentation and the differences in nomenclature are sometimes annoying. Needless to say, the centre of gravity of the book lies in the speciality of the editor: sunspot cycles, tree-rings, weather history and chronology. The referee has successfully consulted the book in many instances.

W. Dieminger

Fitch, A.A. (ed.): Developments in Geophysical Exploration Methods – 6. Elsevier Applied Science Publishers, pp. 264, 120 illust., hard-bound, 1985.

The 6th volume from the series on *Developments in Geophysical Exploration Methods* published over the last several years by A.A. Fitch has just been released. This series is aimed at presenting recent developments in applied geophysics in clear, yet challenging individual contributions. Correspondingly, each volume deals with a spectrum of different subjects, as is the case with the 6th volume.

The first chapter on spike recovery deconvolution concentrates on the restoration of the reflectivity function as a series of ideal spikes in contrast to the usual deconvolution process, where an

inverse wavelet (which is estimated from the trace without considering the change of the wavelet along the trace) is convolved with the trace.

During usual seismic stacking processing arise, as is generally known, stacking errors in the case of dipping strata (there is no longer a common reflection point, and the apex of the NMO hyperbola no longer lies at zero offset). This leads to reduced quality for inclined reflection elements in the stacked section. In the second chapter of the book ("Normal moveout correction, offset continuation, and prestack partial migration compared as prestack processes"), an algorithm dip moveout, DMO, is introduced to correct these errors in connection with usual NMO correction.

The determination of seismic wave absorption from vertical seismic profiles (VSP) is the subject of the third contribution. The problems of determination of seismic attenuation and how to overcome the distorting influences (mainly short time interferencies) are demonstrated by using case histories: (1) From the reflectivity function, deduced from sonic log, a log of the apparent absorption, including all multiples, is computed using the measured input wavelet. This apparent absorption is then subtracted from the computed spectral ratio, derived from the actual data and the inherent absorption will be left. (2) The spectral ratios may be averaged over a short depth interval, thus eliminating structural (apparent attenuation) effects.

A further chapter of the book deals with "The inverse scattering concept and its seismic application" followed by an article on V_p/V_s interpretation, i.e., on the application of shear wave seismics in estimating lithological (physical and facies) parameters. Numerous field examples of surprisingly high quality of the shear wave sections, as is not generally attained today, are presented.

"Stacking methods other than simple summation" is a further subject treated in the volume. Stacking with fixed or data-adaptive statistical weights, iterative and other methods are discussed. The book concludes with a contribution on electrical logging techniques ("Focused resistivity logs").

Like all of the previously published volumes of this series, this volume is a valuable enrichment for the practicing and researching applied geophysicist by its high scientific level presented in clear review contributions. It is of outstanding layout, including printing and the so often problematic reproduction of seismic sections.

L. Engelhard