

BOOKS IN REVIEW

SOVIET ANTARCTIC EXPEDITION, VOL. III

Index XII + 377 pages; 122 illustrations; 79 tables; 23 × 15.5 cm.
Published by Elsevier Publishing Company, P.O. Box 211, Amsterdam,
The Netherlands, 1965; Price Dfl. 40; sh. 80; DM 45

The Soviet Antarctic Expedition was organized in 1955 in connection with Soviet participation in the Antarctic Program of the International Geophysical Year. Not a single expedition, but rather a continuing effort of exploration and scientific investigation, the Soviet Expedition is still recording considerable progress even now — several years after the close of the I.G.Y.

During this period an enormous amount of valuable new data has been gathered to be published in a series of information bulletins appearing in Russian.

The series "Soviet Antarctic Expedition" makes these findings generally available in the English language for the first time.

The present volume, the last in the series, reports the important Soviet findings in the following main areas of investigation: geology, glaciology and meteorology. Auroras, biology, geodesy, geography, geomagnetism, radiowave propagation, transportation across snow and oceanographic studies of the Southern Ocean also form part of the comprehensive treatment.

In presenting the record of the Soviet Expedition's systematic research into so many varied disciplines the volume will be of very great value to a large number of scientists.

THE MINERAL RESOURCES OF THE SEA

by John L. MERO

Elsevier Publishing Company, Amsterdam - London - New York, 1965;
312 pages; 73 figures; XLIII tables; 14 × 22 cm; price Dfl. 30, \$ 8.40, £ 3

The author was chief investigator on a project of economic analysis of mining ocean-floor manganese nodules carried out a few years ago under the sponsorship of the Department of Mineral Technology at Berkeley and the Institute of Marine Resources at San Diego.

The present work arises from the conclusions which that analysis revealed, and takes into account further and more recent developments.

The author maintains that the failure to successfully exploit the sea is due to insufficient information regarding the sea's mineral potential and inadequate methods for recovery. An attempt to remedy this forms the basis of this volume.

It contains an assessment of the total deposits found in the sea and the rate of accumulation of industrially important elements in these deposits. One of the original contributions is the attempt to categorise the various mineral environments of the sea; marine beaches, continental shelves, sea water, deep-sea floor and subsea hard rock. For each area an assessment is made of total mineral deposits and a description of methods of recovery provided. For those areas where no satisfactory method of recovery exists the author outlines techniques which could be successfully implemented.

An explanation of the economic and legal aspects of the subject is also included.

SHORE AND SEA BOUNDARIES

by A. L. SHALOWITZ

Publication 10-1 (Volume Two), U.S. Coast and Geodetic Survey,
U. S. Government Printing Office, Washington, D.C. 20402, 1964.

18 × 20 cm. Illustrated, Appendices, Index, XXVI + 749 pages.

Price \$ 5.25

This is the second of the two-volume treatise on the engineering and legal aspects of shore and sea boundaries. Volume One dealt with a specific problem : the delimitation of the sea boundaries along the California and Gulf coasts of the United States set in the context of Supreme Court decisions, congressional enactments, and the international sea conventions. The pertinent surveys, charts, and tidal data of the Coast and Geodetic Survey were considered in their application to this particular problem. Volume Two extends this application to waterfront boundaries in general, including a section on river boundaries. Some duplication appears in the two volumes, resulting primarily from the different contexts in which certain items are treated, but these have been kept to a minimum. Occasionally, an item is repeated for the purpose of updating, as, for example, the item "Status of the Conventions on the Law of the Sea".

The problem of boundaries, whether shore or sea, is intimately bound up with precise survey methods and precise data. The work of the Coast and Geodetic Survey, which dates back to 1807, meets these standards. Its surveys and resulting nautical charts, therefore, have long enjoyed an authoritative position in tide-water boundary litigation. Knowledge of the legal principles developed by the courts in waterfront disputes is as essential to the engineer, engaged in demarcating the limits of land ownership, as is knowledge to the lawyer of the technical principles on which the surveys and other data are based and which often form the factual background of a litigation. It is the author's conviction that this reciprocal knowledge must be ever present if adjudication and demarcation of valuable shorelands, in particular those determined by tidal definition, are to be bottomed on the best information available. This is the central theme of the volume. But equally important is the orientation of the volume to the specific needs of Coast and Geodetic Survey personnel — present and future — by providing a basic reference and guide for dealing with the technical and legal-technical problems in the area of shore and sea boundaries, and for a variety of other uses.

A major portion of the text is devoted to the use and interpretation of the early surveys and charts of the Bureau and their application to engineering and legal problems. These are discussed in the light of methods, practices, and

symbolization in vogue during successive periods of Bureau history. Throughout the text, the author has neatly interwoven concise statements of Survey participation in a number of water-boundary disputes. There are numerous citations to technical and legal sources which should prove invaluable to those working in this field.

Whereas a great portion of Volume One is international in scope and application, Volume Two is applicable only to the United States. However, newly organized hydrographic offices could profitably adopt the Bureau procedures in maintaining files of the diverse and complex materials destined for the nautical chart — procedures that have proven so useful and practical over the years.

The author has a flair for both style and clear analysis of the complex problems presented and he has successfully avoided what could well have been a dry dissertation. Much significant and interesting material is contained in the footnotes (over 1 000) and this is presented with a minimum of digression. Volumes One and Two indeed add a new dimension to the work of the Coast and Geodetic Survey.

There are 12 chapters in the volume grouped into 3 parts, as follows: (1) Introduction, (2) Early Surveys and Charts of the Coast and Geodetic Survey, and (3) Application to Engineering and Legal Problems. After a brief summary of the origin and history of the Survey, the author delves exhaustively into the availability and use of the vast accumulation of precise facts of an engineering nature in Bureau archives, especially those used in the delimitation and demarcation of waterfront boundaries, to wit, geodetic control data, topographic and hydrographic data, and tidal data.

Part 2 begins with an introductory chapter in which the general aspects of surveys and charts are dealt with, for example, scale, distortion, numbering, and files of data maintained. The terms "survey" and "chart" are defined in order to clarify their technical significance. Even in legal decisions, the author notes, "a confusion in terminology is often encountered and reference is made to a 'chart' when clearly a 'survey' is meant, and vice versa". Emphasis is also placed on the accuracy with which the coastal region has been surveyed over a period of more than a hundred years, such that the courts have repeatedly recognized the competency of these surveys and have taken judicial notice of their accuracy. Infallibility is not claimed, especially as to minute detail, but resurveys have consistently shown that remarkably few errors have crept into the work.

As a basis for a better understanding of the later chapters on the interpretation of surveys and charts, the author has included a chapter on "Geographic Datums" in which the figure of the earth and spheroids of reference are discussed, preliminary to a consideration of various geographic datums in use in the past and the ultimate development of a single datum for all horizontal control work in conterminous United States and in Alaska — the North American 1927 Datum. This is followed by a chapter on "Multiple Projection Lines on Early Surveys", in which the reasons for their existence and the methods of reducing them to a common basis are described. In the engineering use of surveys, whether for studies of shoreline changes or for other purposes, critical evaluation is impossible unless comparable projection lines appear on all surveys common to an area.

In the chapters on hydrographic and topographic surveys, analysis and interpretation are approached through the early instructions and manuals, copies of which are no longer available for general consultation. The author has made a thorough research into these sources and has presented their salient provisions,

insofar as they might affect boundary determination. Further reference to these documents should not be necessary. No other approach would have been practical because of the virtual impossibility of examining all the early surveys. But the methods and practices used at different times are tied in with specific surveys. This the author rightfully cautions should not be considered as "necessarily representative of all the surveys of that period", but rather as "a practice that was in use, and to that extent will assist in a better understanding of the practices and procedures developed through the years". The section on "Significant Features on Hydrographic Surveys" is of the utmost importance in the study and interpretation of early hydrographic surveys, and the author has laid special emphasis on those features that may have boundary significance — for example, the low-water line and planes of reference.

In the chapter on topographic surveys, considerable discussion is devoted to planetable mapping of the high-water line — the line that separates public from private ownership in most of the States. The basis for its use, its accuracy of determination, its location in marsh-fringed areas, and its identification on the ground are given special consideration. A significant contribution to the interpretation of topographic surveys, particularly the early ones, is the inclusion of a section on "Chronology of Conventional Symbols Used in the Coast Survey", with accompanying illustrations. Such information is repeatedly sought from the Bureau by engineers and lawyers.

The closing chapter of Part 2 concerns the "Interpretation and Use of Nautical Charts", and follows logically the discussion of topographic and hydrographic surveys. This is the longest chapter in the book, and the author deals comprehensively but concisely with all important elements of the mariner's chart, as well as their legal implication. The author rightfully admonishes against the use of a nautical chart for a quantitative determination of shoreline changes, or for the establishment of an early tidal shoreline, where the large-scale surveys would furnish a better criterion. However, the nautical chart has been used in many legal contexts in connection with admiralty proceedings and with proposed federal legislation, and it is with these in mind that the material has been developed. The chapter is not repetitive of the Nautical Chart Manual. The early practices as well as current practices are considered in terms of the user of charts rather than the maker. The "how" thus gives way to the "what" and "why".

The chapter begins with a short but interesting statement on the evolution of the nautical chart. The significant developments in cartography from Ptolemy to Mercator and their influence on contemporary chart-making are dealt with. The author finds the Mercator projection less objectionable for world mapping than the tripartite and quadripartite arrangements seen in other projections when extended to world proportions. A section on the "Modern Nautical Chart" follows in which the chart as the end-product of the field operations is considered in relation to the advances made in surveying techniques. Chart accuracy and reliability are dealt with in light of the Federal Tort Claims Act — a waiver of immunity statute enacted in 1946 — which holds the Government responsible for the negligent act of its component agencies in certain situations and under certain factual conditions. This enactment, the author points out, "has made the Bureau even more conscious of the need for maintaining the highest accuracy standards in its nautical charts".

Significant features on nautical charts including symbolization, are analyzed and special emphasis given those features and symbols that must be thoroughly understood by the chart user in preparing a legal action — for example, planes of reference, dates on charts, tide notes, high- and low-water lines, improved channels, and dangers to navigation. Complete symbolization is included in an

appendix, which is a multicolor reproduction of the symbols and abbreviations promulgated by the U. S. Coast and Geodetic Survey, the U. S. Oceanographic Office and the U. S. Lake Survey, and follows in the main the Resolutions of the International Hydrographic Conferences.

An important part of the chapter is the section on "Rules of the Road Boundary Lines" — those charted administrative lines which separate the waters controlled by the international rules of navigation and those controlled by the inland rules. Since considerable confusion as to the exact import of these lines has arisen in the past, the author clarifies their intent, insofar as the status of the water areas inshore and offshore are concerned, by citing several judicial and administrative interpretations. Four plates in black and white show the disposition of the lines along the Atlantic, Gulf, and Pacific coasts.

The concluding sections of the chapter pertain to "Definitions Relating to Nautical Charts" and "Using Nautical Charts". In the first, the nomenclature of ocean bottom features and shore terminology are given; in the second, the problems of determining direction, distance, and position on Mercator charts are dealt with.

In Part 3, the author first examines some dramatic changes in shoreline as evidenced by successive surveys of the Survey. This is followed by a discussion of various types of maritime boundaries together with the principles developed in national and international forums for their delimitation. Bay, river, and high seas boundaries are included as well as the limits of oceans and seas of the Western Hemisphere promulgated by the International Hydrographic Bureau. This is followed by a chapter on the judicial structure in the United States, which provides a background for the actions taken and opinions delivered by federal and state courts in adjudicating boundary disputes. Although the chapter is in its logical place in the book, an engineer unfamiliar with the legal aspects of boundary making could profitably read it before delving into technical aspects of his specific problem. The next chapter deals with land ownership in the United States and among the subjects treated are the federal power to acquire territory; federal, state and private ownership of land; the rectangular system of surveys; and a host of related material, all directly or indirectly bearing upon the theme of the book. The final chapter deals with some of the legal aspects of the Bureau's work. Several boundary adjudications are discussed in which the Coast and Geodetic Survey actively participated either in the interpretation of its technical data or in the actual operation of demarcation. Some of these have had far-reaching effect in establishing legal principles in boundary litigation. This chapter ends with a discussion of navigable waters and riparian rights, both of which flow from the nature of the Bureau's work and the area in which it operates.

There are seven appendices, including the usual bibliography and table of cases cited and a comprehensive glossary of legal and technical terms used in the text. Of great interest are the two appendices dealing with tidal boundaries. In the first, three court decisions are included that have had an important impact on the development of the law of tidal boundaries in the United States; in the second, those physical factors are discussed that must serve as a background to any adequate consideration of the relation of the tide to property boundaries. This will be a subject of primary importance as long as boundary disputes arise along tidal lands.

The author has brought to this task a lifetime of experience in both field and office, and his unique talents in this area of Coast and Geodetic Survey endeavor are forcefully brought out in the note "About the Author" by the Director of the Survey, Rear Admiral H. Arnold KARO. He has served the Bureau and the Nation in many capacities, and his researches and writings range from

such technical subjects as an original treatment on the conversion of radio bearings to mercatorial bearings and an authoritative exposition on the horizontal transmission of sound through sea water, to the present legal-technical treatise on *Shore and Sea Boundaries* which this reviewer considers a credit to the Coast and Geodetic Survey and a fitting monument to the author's nearly 50 years of service.

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Past President Directing Committee IHB

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