

International Subcommittee on  
Stratigraphic Classification of IUGS  
International Commission on Stratigraphy

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# **INTERNATIONAL STRATIGRAPHIC GUIDE**



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**A GUIDE TO STRATIGRAPHIC CLASSIFICATION,  
TERMINOLOGY, AND PROCEDURE**

Second Edition

Amos Salvador, Editor

International Subcommittee on Stratigraphic Classification  
of IUGS International Commission on Stratigraphy

# **INTERNATIONAL STRATIGRAPHIC GUIDE**

*A GUIDE TO STRATIGRAPHIC  
CLASSIFICATION, TERMINOLOGY, AND  
PROCEDURE*

Second Edition

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# Foreword

We thank Amos Salvador for his tremendous work in preparing the second edition of the *International Stratigraphic Guide*. From 1977 to 1993, 32 circulars totaling more than 1,000 pages were distributed, soliciting suggestions for the new *Guide* from members of the ISSC (a subcommission of the ICS) and from stratigraphers all over the world. By using this method, an extremely valuable document was improved and updated.

As stated in the Preface by Professor Salvador, this book is intended to be a guide and not a code; nobody “should feel constrained to follow it . . . unless convinced of its logic and value.” This open-mindedness is the very strength of the *Guide*. Gathering suggestions from stratigraphers of different traditions and from different regions with their specific problems and methods inevitably led to conflicting views. These had to be reconciled as much as possible. Even though stratigraphic terminology cannot be codified (unlike nomenclature!), the need of a common language is obvious—hence the necessity to reach a compromise between conflicting usages. On this issue, the *Guide* will be helpful in provoking animated and fruitful discussions about the principles of stratigraphy.

One important aspect of the second edition of the *Guide* is that the classification of igneous and metamorphic rocks is given more attention than in the first edition. This extends the *Guide* into fields outside classic stratigraphy, including all kinds of mappable rock bodies. Moreover, entirely new chapters have been added to the second edition; these chapters address subjects that were not included in the *Guide*'s first edition—magnetostratigraphy is one of these topics. Another new chapter deals with unconformity-bounded units, whereas sequence stratigraphy, actually much more *en vogue* in petroleum exploration, was not addressed. Which one of these two approaches will survive—or will they merge into a synthesis? For the time being, this is an open question, but whatever stratigraphy will be in ten or twenty years, the second edition of the *International Stratigraphic Guide* will stand as a milestone in its evolution.

Jürgen Remane  
Chairman of the International  
Commission on Stratigraphy (ICS)



# Preface

The twenty years that preceded the 1976 publication of the first edition of the *International Stratigraphic Guide* were years of intense activity, turmoil, and controversy concerning concepts and principles of stratigraphic classification, terminology, and procedures. Many new ideas were proposed, debated, and often refuted; many polemics developed; and radically opposite views were expressed with equally unshakable conviction. As a result, the number of publications on matters of stratigraphic classification, terminology, and procedure grew strikingly, as shown in Figure 1.

A flood of new terms overwhelmed the stratigraphic literature (see glossary of stratigraphic terms), and numerous national and regional stratigraphic codes were published, as illustrated in Figure 2.

As both graphs show, the publication of the first edition of the *Guide* was a

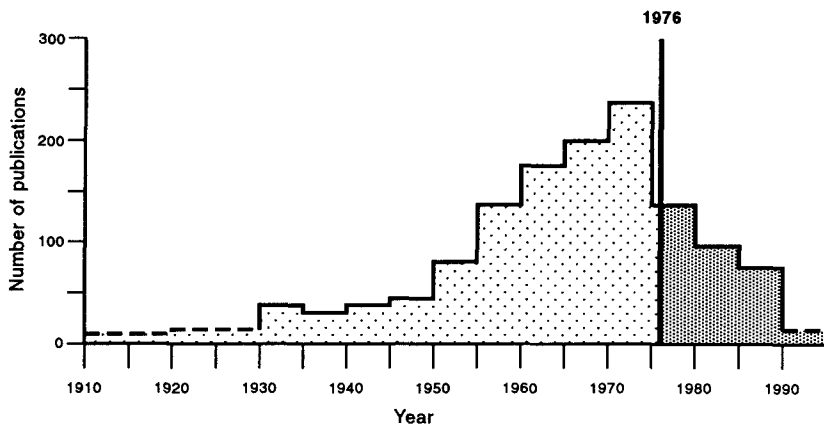


Figure 1. Number of publications on matters of stratigraphic classification, terminology, and procedure.

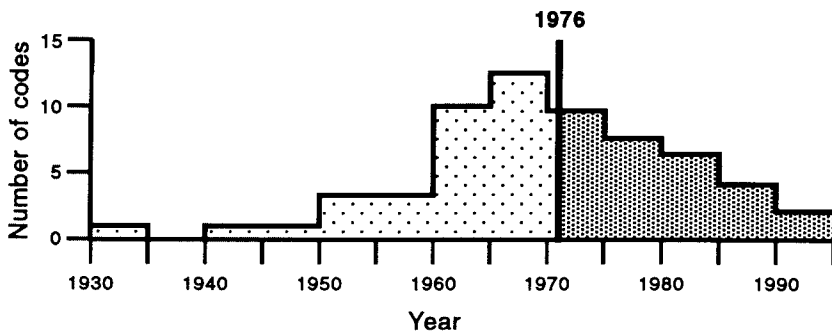


Figure 2. Number of national and regional stratigraphic codes.

turning point for the stabilization of the development of concepts and principles of stratigraphic classification, terminology, and procedure. The recommendations of the *Guide* were readily accepted by a great majority of stratigraphers throughout the world, and the contentious debates and controversies of the years preceding its publication diminished in frequency and intensity, as reflected in the decreasing number of publications on matters of stratigraphic principles. A similar reduction in the number of proposed new stratigraphic terms has been evident. The *Guide* was translated into Chinese, French, Russian, Spanish, and Turkish, and the decreasing number of national stratigraphic codes published after the appearance of the *Guide* followed to a great extent its principles, terminology, and recommended procedures.

The success of the first edition of the *International Stratigraphic Guide* in settling many controversies about stratigraphic principles, terminology, and procedures, and in having its recommendations accepted by a great majority of stratigraphers throughout the world, should be credited to Hollis Hedberg, founder and first chairman of the International Subcommittee on Stratigraphic Classification (ISSC). He led the activities of the Subcommittee during its early and more difficult years, and, in spite of strong opposition, he saw his efforts fully rewarded with the publication of the *Guide* and with its widespread acceptance as the international standard for stratigraphic classification, terminology, and procedure. Hollis Hedberg provided the foundation of modern stratigraphy, and his publications, in particular the *International Stratigraphic Guide*, will be remembered as the source of a widely adopted stratigraphic terminology that has made possible clearer and easier communication, understanding, and cooperation among stratigraphers throughout the world.

As mentioned in the introduction (Chapter 1), new to this second edition of the *International Stratigraphic Guide* are two chapters—Chapter 6 (unconformity-bounded units) and Chapter 8 (magnetostratigraphic polarity units)—and a glossary of stratigraphic terms. Chapter 7 (biostratigraphic units) and Chapter 9 (chronostratigraphic units) required the most extensive revision, as did the treatment of igneous and metamorphic rock bodies in Chapter 5 (lithostratigraphic units). The bibliography and the list of national or regional stratigraphic codes have been revised and updated. In keeping with the growth and progress of geologic knowledge, stratigraphic thinking must continually evolve; the revisions made in this new edition of the *Guide* reflect such growth and progress.

The purposes of this second edition of the *International Stratigraphic Guide* are, however, the same as those of the first edition: to promote international agreement on principles of stratigraphic classification and to develop an internationally acceptable stratigraphic terminology and rules of stratigraphic procedure, all in the interest of improved international communication. The spirit of the *Guide*, likewise, remains unchanged. The ISSC offers this second edition as a recommended approach to stratigraphic classification, terminology, and procedure, not as a “code.” No individual, organization, or nation should feel constrained to follow it, or any part of it, unless convinced of its logic and value. The ISSC still believes that matters of stratigraphic classification, terminology, and procedure should not be legislated. The purpose of the *Guide* is to inform, to suggest, and to recommend.

The long and complex process of revising the first edition of the *International Stratigraphic Guide* involved the efforts of many organizations and individuals. National stratigraphic commissions and committees, particularly those who had published national codes since the appearance of the first edition of the *Guide*, made important contributions. While many of these more recent national codes used the *International Stratigraphic Guide* as the model, the codes, in turn, served as invaluable bases for the revision of the *Guide*, in an extremely helpful process of leapfrogging. The *North American Stratigraphic Code* and the *Field Geologist's Guide to Lithostratigraphic Nomenclature in Australia* were particularly useful in this respect.

Many members of the ISSC, and numerous non-members, also contributed significantly to the preparation of the revision of the *Guide*. Michael Murphy, the present ISSC chairman, and Timothy Anderson joined me in the final editing of the text of the revision. William Berggren, C. W. Drooger, Lucy Edwards, and Michael Murphy provided a great deal of help in the extensive and difficult revision of the chapter on biostratigraphic units. Betty Kurtz untiringly produced the numerous drafts of the text and attachments—the bibliography, the glossary of stratigraphic terms, and the list of national or regional stratigraphic codes.



To them, and to all ISSC members and non-members who so effectively contributed to the preparation of this second edition of the *International Stratigraphic Guide*, I express my most sincere appreciation.

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on Stratigraphic Classification (ISSC)  
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March 1993

## Preface to First Edition

Stratigraphy is a global subject, and international (global) communication and cooperation are necessary if we are to adequately comprehend the picture of the rock strata of the Earth as a whole, and to restore the history of *how*, *when*, and *why* these strata came to be *what* and *where* they are today.

Agreement on stratigraphic principles, terminology, and classificatory procedure is essential to attaining a common language of stratigraphy that will serve geologists worldwide. It will allow their efforts to be concentrated effectively on the many real scientific problems of stratigraphy, rather than being wastefully dissipated in futile argument and fruitless controversy arising because of discrepant basic principles, divergent usage of terms, and other unnecessary impediments to mutual understanding.

This *International Stratigraphic Guide* has been prepared by the International Subcommittee on Stratigraphic Classification (ISSC) for those geologists anywhere (whether in academia, in research, or in industry) who wish to express their observations and thoughts on stratigraphy more clearly and, in turn, who wish to comprehend more clearly the stratigraphic information presented by others. It is particularly aimed at the needs of those whose work and interests are worldwide, or, at least, take them across national boundaries.

Diverse as are the strata of the Earth and their properties, they are certainly no more diverse than are the natures and characters of the persons who study them. All of our classifications and terminologies of natural bodies are no more than an attempted ordering contrived by human beings for the purpose of aiding our own imperfect conception and understanding of the infinite complexities of nature; and as such they have all the weaknesses of the human minds in which they have originated. Classification and terminology of rock strata are no exception.

The process of bringing together the diverse views on stratigraphic principles, classification, and terminology, developed from many different backgrounds, and of building these into a single set of practical terms and guidelines to which almost all can in large measure subscribe, has necessarily been a slow and patience-consuming task. Perhaps only those who have lived through the 20 years of work with the Subcommittee can appreciate the thorny path along which it has had to make its way, contending first with apathy and then at times

with fierce opposition, and continually being forced to pick its way through thickets of nationalism, regionalism, traditionalism, conservatism, and radicalism, in trying to arrive at the best majority consensus. It is of course a task that never will be finished. The publication of the present *Guide* should be looked on merely as a step in what should be a continuing course of progress to meet the continually growing needs of the science.

The present first complete edition of the *Guide* reorganizes and consolidates the thought of the many previously published circulars and preliminary reports of the Subcommittee into what is hoped to be a more coherent and comprehensive whole. It attempts to eliminate unnecessary repetition, clarify conclusions, demonstrate certain points graphically by figures, and in general improve organization, wording, and manner of expression. An extensive bibliography of some 1500 entries accompanies the *Guide* and in itself provides an important part of the history of the growth of ideas incorporated in the *Guide*. It is a source of reference to many divergent views and philosophies worthy of consideration, which for want of space could not be discussed in the *Guide* itself.

The preliminary consolidation of the earlier reports into a draft of a single-volume *Guide* was carried out in 1974 by a small editorial committee consisting of Neville George, Charles Pomerol, Amos Salvador (vice-chairman of the Subcommittee), Jovan Stöcklin, and the chairman, who together have carried the chief burden of this task. Their draft was then sent to the other members of what was originally an 11-man editorial board selected jointly by V. V. Menner and H. D. Hedberg in 1972 (Ivo Chlupáč, H. K. Erben\*, Martin Glaessner, Ian Speden, Ryuzu Toriyama, and A. I. Zhamoida), who supplied additional valuable criticism. Another draft was then referred to the full membership of the Subcommittee (125 members), who offered further useful suggestions and criticism, and by a vote of 85 to 3 approved publication (see Appendix D of the 1976 edition). (It is emphasized that the affirmative votes, as in the case of previous ISSC Reports, indicate approval for publication, but not necessarily full agreement with all of the substance of the text.)

Continuing work by the Subcommittee will now be devoted to studies and recommendations on the many special aspects of stratigraphy to which adequate attention could not be given in this first unified edition of the *Guide*. It will also be devoted to consideration of criticism and suggestions that have been invited from geologists in general as background for the eventual preparation of improved further editions.

In conclusion, the editor expresses his appreciation to all, members and many non-members, who have contributed to the preparation of this volume,

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\*In a letter of September 26, 1974, Professor Erben asked to be disassociated from the editorial board.

and expresses his hope that it may be of service to stratigraphers all over the world and to the geological public in general. He also acknowledges his gratitude to the International Commission on Stratigraphy, the International Union of Geological Sciences, and the International Geological Congresses for their support and help with the publication of this and earlier Reports.

Finally, particularly grateful acknowledgment is due to Dr. Amos Salvador for constant help and advice in the preparation and assembly of text and illustrations and for unremitting efforts to improve the *Guide*; to Mrs. E. J. Spencer for her willing and efficient work that went far beyond the "call of duty" in producing the numerous drafts of both text and bibliography that have been necessary; and to Frances Hedberg for assistance in innumerable ways throughout the course of the work and for her help in the checking and preparation of the material for submission to the publisher.

Hollis D. Hedberg, Editor  
Chairman of International Subcommittee  
on Stratigraphic Classification (ISSC)  
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