International Union of Geological Sciences
International Commission on Stratigraphy

International Subcommission on Stratigraphic Classification
ISSC
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CONTENTS

BRIEF HISTORY OF ISSC ................................................................................................................... 2

EDITORIAL ........................................................................................................................................ 3

NEW STATUTES OF ICS APPROVED BY IUGS IN 2002 ................................................................. 4

ISSC MEMBERSHIP ............................................................................................................................ 7
  PROPOSED NEW MEMBERS (NEW BLOOD) LISTED ALPHABETICALLY ........................................... 8

FATE OF THE WORKING GROUPS AND PROJECTS STARTED DURING ALBERTO RICCARDI
CHAIRMANSHP (1996-2002) .............................................................................................................. 16
  WORKING GROUP ON SEQUENCE STRATIGRAPHY ......................................................................... 16
  WORKING GROUP ON CYCLOSTRATIGRAPHY .................................................................................. 19
  PROJECT ON “GLOSSARY OF STRATIGRAPHIC TERMS” ............................................................... 20

“POST-HEDBERG DEVELOPMENTS IN STRATIGRAPHIC CLASSIFICATION” AN ISSC WORKSHOP
OF THE 32° INTERNATIONAL GEOLOGICAL CONGRESS TO BE HELD IN FLORENCE IN AUGUST
2004. MOTIVATION - STATE OF THE ART – PURPOSE - CALL FOR PAPERS ................................. 21

ELECTIONS .......................................................................................................................................... 23

LIST OF THINGS TO BE DONE ........................................................................................................ 23

OBITUARY OF PROF. IVO CHLUPAC .............................................................................................. 24
BRIEF HISTORY OF ISSC

Chairman

Milestones

1952-1977  H. D. Hedberg


1977-1992  A. Salvador

1992-1994  M. A. Murphy


1994-2002  A. C. Riccardi


2002-2004  M. B. Cita

EDITORIAL

This is my first editorial written for ISSC and you will notice a change in style but not in goals. I strongly feel that our Subcommission differs substantially from all the other Subcommissions of ICS because we are not looking for new GSSPs or for new data sets. We all know that some of the formally accepted GSSPs are weakly defined, but it is better to have a conventional boundary than a floating stratigraphy.

We are responsible for the definition of the rules, and of their application. We do not need real specialists in Graptolites, or in Planktonic Foraminifers, or in Magnetostratigraphy, etc.; we do need strong scientists, good stratigraphers with experience in field mapping and close relationship with national Geological Surveys from all over the world, from all the continents we need representatives of National stratigraphic commissions to interact with the local communities. However, we have to respect the new statute of ICS, approved last year by IUGS.

After fifty years of activity ISSC appears in a steady state, which is inappropriate: we need new blood if we want to take an active part in the renaissance of stratigraphy, if we want to be the protagonists of our future.

The advances undergone by stratigraphy in the last fifty years are enormous just because of long lasting, very successful exciting scientific projects as DSDP-ODP, ice coring in high latitudes, continuous coring in lacustrine environments. Isotopic stratigraphy was not even born in the early fifties, but it is now a leading science for understanding the evolution of our planet, at least starting from the Cretaceous.

The distinction among trends, events and cycles is so strikingly clear in the deep sea record that cannot be ignored anymore.

I see a great future ahead of us. Do not complain about what has been done or has not been done in the past: we are not a geriatric club! Just wake up and go ahead.

We need clear thinking and to carefully control the applications of the rules that have been set up, the problem arisen, the opportunity (advantages versus disadvantages) to create new rules.

We need leadership, and an open-minded attitude:

What is a stage?
What is a formation?
What is a cycle?
What is a biohorizon?
What is an unconformity-bound unit??

We have always to keep observations and interpretations well separated. This is to me the strong message of Hedberg’s approach that survived three generations of geologists. I do hope that you understand this, and that you respond to my request of real, active participation.

The correspondence by e-mail in the last few months is promising, but the real (not long distance) personal meeting planned for the Florence 2004 IGC is much better. In my view, ISSC members are offered a unique opportunity to compare their experiences, to propose their ideas, to familiarize with each other, to create a coordinated program.

I do not intend to indoctrinate anyone, just have great expectations from each of you.

ISSC Chairman

Maria Bianca Cita
NEW STATUTES OF ICS APPROVED BY IUGS IN 2002

Extract from the New ICS Statutes approved by IUGS at their annual meeting in Wellington (New Zealand) in 2002:

STATUTES
of the
INTERNATIONAL COMMISSION ON STRATIGRAPHY
(ICS)

CONTENTS
1. Preamble and Definitions
2. Purpose and Objectives
3. Organization
4. Executive Committee
5. Subcommissions
6. Ad Hoc Committees
7. Task Groups
8. Establishment and Dissolution of Constituent Bodies
9. Terms of Office, Elections and Voting
10. Meetings
11. Ratifications
12. Annual Reports
13. Entry into Force and Amendments to Statutes

2. PURPOSE AND OBJECTIVES
ICS is a body of expert stratigraphers founded for the purpose of promoting and coordinating long-term international cooperation and of establishing and maintaining standards in stratigraphy.
Its principal objectives are:
(a) the establishment and publication of a standard global stratigraphic time scale and the preparation and publication of global correlation charts, with explanatory notes,
(b) the compilation and maintenance of a stratigraphic database center for the global earth sciences,
(c) the unification of regional chronostratigraphic nomenclature by organizing and documenting stratigraphic units on a global database,
(d) the promotion of education in stratigraphic methods, and the dissemination of stratigraphic knowledge,
(e) the evaluation of new stratigraphic methods and their integration into a multidisciplinary stratigraphy, and
(f) the definition of principles of stratigraphic classification, terminology and procedure, and their publication in guides and glossaries.
The scientific activities shall be carried out through projects or meetings arranged in collaboration with IUGS-affiliated organizations, IUGS-joint programs, non-governmental bodies and inter-governmental bodies.

5. SUBCOMMISSIONS
Subcommissions of ICS are organizational bodies with specific, longer-term scientific tasks such as the standardization of stratigraphic units, the documentation and communication of major stratigraphic data to the global earth-science community, and international stratigraphic cooperation.

5.1. Composition
Each Subcommission shall be managed by a chair and a secretary. A vice chair may also be elected. Subcommissions report to the Executive Committee and may be terminated if they fail to respond to its communications.
The voting membership of the Subcommission consists of its management and up to twenty of their members, and is referred to as the Voting Subcommission. These twenty voting members shall represent regional and methodological diversity in an appropriate manner. Membership may be terminated if a voting member fails to participate for 6 months or more in the work of the subcommission, and/or does not respond during this time to communications from its chair. Subcommissions may appoint a reasonable number of corresponding members to advise voting members in achieving the assigned scientific tasks. The corresponding membership shall reflect regional and methodological diversity in an appropriate manner.

5.2. Officers
The chair shall be the leader of the Subcommission. The chair is responsible for the execution of agreed-upon scientific goals and the preparation and the contents of annual scientific and financial reports of the Subcommission. In
consultation with the voting members of the Subcommission, the chair shall establish work plans and operating budget requests for the following year. 
The vice chair shall serve as chair if the position of chair should become vacant.

The secretary is appointed by the chair of the Subcommission, shall assist the chair with scientific and administrative duties, and is responsible for the organization of votes within the Subcommission.

5.3. Results
The progress and results of Subcommissions are annually reviewed by the Executive Committee. The Executive Committee may dissolve a Subcommission upon completion of its entrusted mandate or if the Subcommission is inactive. A Subcommission is considered inactive when it no longer elects executive officers, submits annual reports, or no longer responds to communications and ballots from the Executive Committee. The decision on dissolution requires consent from IUGS.

5.4. Other Bodies
Subcommissions may appoint such Task Groups (see 7), regional committees or other ad hoc groups, which they consider necessary to fulfill their scientific tasks. These bodies report to the chair of the respective Subcommission. Subcommissions that are responsible for system or higher subdivisions of the international stratigraphic scale shall establish Task Groups for the purpose of defining the lower boundaries of component geochronologic/chronostratigraphic units, if such boundaries have not yet been defined. Boundary stratotypes are sought to the level of stages, but not at smaller stratigraphic scales.

7. TASK GROUPS
Task Groups are organizational bodies for limited, short-term stratigraphic tasks. Task Groups generally are organized under individual Subcommissions, but the Executive Committee also may appoint Task Groups for specific tasks that relate to its activities and responsibilities. Commonly, a Task Group is created for the selection and definition of the lower boundaries of geochronologic/chronostratigraphic units. Task Groups may also be created for the purpose of replacing and/or selecting new boundary definitions, stage units or other stratigraphic units. Each Task Group will have a single scientific task.

7.1. Task
Task Groups have a four (4) year term that may be extended for a single additional four (4) year term, depending on sufficient progress with the entrusted task.

7.2. Officers and Members
Officers of a Task Group are the leader and the secretary. These officers are selected either by the Executive Committee, or by the management of Subcommissions, depending under which body the Task Group resides.

Task Groups may appoint a reasonable number of members that represent regional and/or methodological diversity in an appropriate manner. Membership may be terminated if the member does not respond to communications from its Task Group chair.

7.3. Results
The progress and results of Task Groups are annually reviewed by the Subcommission and/or Executive Committee under which they reside. Task Groups may be terminated if they fail to respond to communications from the individual Subcommission or Executive Committee under which they reside.

7.4. Voting
Task Groups organize votes (see 9) by its members to decide critical scientific issues, and prepare reports of its decisions for submission to the Subcommission or the Executive Committee under which they reside.

7.5. Terms of Office
Task Groups are automatically dissolved once they have fulfilled their objective, scheduled such that the objective is completed within four (4) or a maximum of eight (8) years (see 7.1).

9. TERMS OF OFFICE, ELECTIONS AND VOTING
9.1. Terms of Office for Officers
The terms of office for the officers of the Executive Committee, the Subcommissions, Ad Hoc Committees, and Task Groups shall be the period between two International Geological Congresses (IGC), normally four (4) years. All
officers, except for the councilor, can be re-elected for one additional term of four (4) years. If circumstances necessitated the term of office to begin in the interval between two IGCs, the period of office will not be extended beyond the second IGC after the officer started in his/her function.

9.2. Terms of Office for Voting Members
The terms of office for the voting members of Subcommissions and Task Groups shall be the period between two IGCs, normally four (4) years, and can be extended for a maximum of two additional four (4) year periods.

9.3. Election of the ICS Executive Committee
Eighteen months prior to the International Geologic Congress, the Executive Committee appoints the chair of the Nominating Committee, which shall not include any of the Executive Committee. The chair of the Nominating Committee shall select two (2) additional Nominating Committee members.

The Nominating Committee shall invite proposals from all Subcommissions of ICS of candidates for the positions of chair and vice chair of the Executive Committee, but the Committee shall not be restricted thereby in its choice of candidates. Officers of the Executive Committee, with the exception of the councilor, may request re-election for one term beyond their first one (see 9.1).

The Nominating Committee shall evaluate the merits of all proposed candidates for each position, taking into consideration their scientific qualification, managerial capability and willingness to serve. The Committee shall nominate to the ICS chair at least two candidates for each of the two elected positions no later than twelve (12) months prior to the next IGC. The nominations should in mind geographical and disciplinary diversity, in order to ensure that the principle schools of stratigraphic thought are represented in the Executive Committee.

Upon receipt of the Nominating Committee's submission, the secretary general shall promptly circulate the proposal of nominated candidates to all the members of the Voting Commission for voting and election (see also 1c and 9.7).

The election requires approval by IUGS.

9.4. Election of the Managing Committee of Subcommission
Two chairs and two optional vice chairs of a Subcommission of ICS are proposed to ICS after appropriate ballot within each Subcommission. From these candidates the new officers are subsequently elected by the Voting Members of the Commission (see 1c) by ballot to be mailed by the general secretary not later than twelve (12) months prior to the next IGC. All members of the managing committee of Subcommissions are approved and ratified by the ICS Executive Committee.

9.5. Election of the Leaders of Task Groups
The leaders (chair and secretary) of a Task Group are proposed by the management of the Subcommission or the Executive Committee of ICS under which the Task Group resides. Task Group leaders are confirmed by normal voting procedure in the ICS Subcommission or ICS Executive Committee under which they reside.

9.6. Election of the Voting Members of Subcommissions and Task Groups
Voting members of new Subcommissions are elected by its initial executive. New voting members of existing Subcommission are elected by its executive, upon consultation with existing voting members, and confirmed by the Executive Committee of ICS.

Voting members of Task Groups are elected by its executive, in consultation with existing voting members, and confirmed by the management or executive of the ICS body under which the Task Group resides.

9.7. Voting Procedures in ICS
The members of the Voting Commission, Subcommissions and Task Groups make their decisions by vote. For approval, all decisions, including elections, require a sixty percent (60%) majority of delivered votes, provided that a quorum of 60% has been attained. In cases where no quorum is attained the first time around, a second round of voting is organized. Elections with more than one candidate will require the winner of a relative majority of less than 60% to pass a second ballot listing only him/herself, where he/she has to receive a 60% confirmation.

Voting shall be conducted by postal ballot or electronically (email), giving a deadline of sixty (60) calendar days for the receipt of the votes. Voting Members may vote "yes," "no" or officially "abstain". In case of electronic voting confirmation may also be requested on paper by postal ballot.

Formal meetings of ICS that attain a quorum of 60%, can arrange in-session ballots.
ISSC MEMBERSHIP

The Subcommission on Stratigraphic Classification is the oldest and by far the largest of ICS: it was founded during the 19th International Congress held in Algiers in 1952, following an initiative put forward by Hollis D. Hedberg.

Unlike all others Subcommission, that consist of voting members and corresponding members, ISSC has three categories:

1. ex-officio members (that is chairmen of all others Subcommissions plus ICS chair and vice-chairs);
2. individual members, appointed individually on the basis of nominations and approval by a nominating committee;
3. organizational members, that is stratigraphers representing national organizations as Geological Societies or Geological Surveys or Stratigraphic Commissions.

Total number exceeds 70, but it happens that a single person may belong to two or even three categories, as it happened to me when I chaired the Neogene Subcommission, being at the same time an individual member (since the sixties) and an organizational member (as chair of the Italian Stratigraphic Commission). Individual members last forever, even if they are totally inactive for many years.

ISSC never meets: no workshops or field excursions are organized. The only meetings of ISSC I attended were in occasion of International Geological Congresses held in Montreal (1972), Sydney (1976), Paris (1980), Washington, DC (1989), Kyoto (1992), Peking (1996), with a very limited attendance and an agenda looking more as a business meeting that as a scientific event.

Meanwhile, the high profile that characterized the Subcommission in the early days (that is during the preparation and after the publication and dissemination of the International Guide of Stratigraphic Classification in 1976) started to decline, whereas its relationships with the parent body deteriorated.

The “old boys club” style does not meet the requirements of the new generations of stratigraphers, that are quite active and are working hard to find new ways to identify and correlate the stratigraphic record of continuous sequences recovered from the deep-sea record (DSDP and ODP cores), from the record of endoreic lakes (Baikal, Monticchio), from ice cores (Greenland, Antarctica).

What to do next?

We need new blood, but we want to keep the experience, expertise and corporate memory of existing members, at the condition that they are really active and participate to this effort to revitalize stratigraphy that is and has always been a core business in earth sciences.

In other words, we do not provide yet a new list of voting and corresponding members for several reasons.

The membership list for 2001 is in the website.

We have to follow the rules of the new ICS Statutes (see page 4).

The new members selected after appropriate negotiations are here presented, with curriculum vitae and photographs to all existing members for their approval, as required by the statute.

Active versus inactive is much more important than voting versus corresponding members. Indeed very seldom (if ever) there has been a postal ballot requiring a quorum within ISSC.
The two important messages sent on July 11 and November 5, 2002 to ISSC members were conceived as a test of their real interest to “their” Subcommission. The numerous, positive or even enthusiastic answers received motivated the present attempt to rejuvenate the Subcommission and to make it more aggressive scientifically. At the end of the organizing process, the roster of ISSC will include 20 voting members (including the new ones), as many as we want corresponding members (including those who specifically indicated that they wanted to become corresponding) plus a mailing list including the past ex-officio and other key persons with whom we want to interact. But we have to keep some flexibility until the reshaping is showing up clearly.

PROPOSED NEW MEMBERS (NEW BLOOD) LISTED ALPHABETICALLY

S. Hasegawa
F. J. Hilgen
M. R. Petrizzo
N. J. Riley
A. Strasser
J. Zalasiewicz

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Curriculum Vitae
Shiro Hasegawa was born on 22-01-1949 at Tokyo, Japan. He passed his BSc at the Waseda University in 1971 and his MSc and D.Sc. at the Graduate School of Science (Tohoku University) in 1975 and 1978, respectively. From 1979 to 1981 he was postdoctoral researcher of Japan Society for the Promotion of Science at Tohoku University, and research associate at the same university from 1981 to 1992. Associate professor from 1992 to 1993 at the Institute of Geology and Mineralogy at the Hokkaido University, and then associate professor at Laboratory of Geosphere Science at the Graduate School of Environmental Earth Science (Hokkaido University) from 1993 to 2001. Since 2001 he is Professor at the Faculty of Science at the Kumamoto University. He was ODP shipboard scientist in Leg 107. His current research mainly deals in micropaleontology (Foraminifera). He belongs to the great Japanese school of stratigraphy (Nakagawa, Takayanagi,
Saito, Okada, Oda and Nijtsuma) of the Tohoku University in Sendai which is one of the oldest universities in Japan.

Selected Publications


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Curriculum Vitae
Frederik J. Hilgen was born on 21-11-1957 at Almelo, the Netherlands. He is married, has 3 children and presently lives in the historical town of Brielle in the western part of the country. He received his high school education in his hometown. He passed his BSc on Geology and Paleontology at the Utrecht University (UU) in 1980 and his MSc, with a major in Stratigraphy and Paleontology and minors in Sedimentology and Economic Geology, in 1984. He completed his PhD thesis entitled “Astronomical forcing and geochronological application of sedimentary cycles in the Mediterranean Plioence-Pleistocene” at the same university in 1991. Afterwards he held several post-doctoral positions in particular as Research Fellow of the Netherlands Royal Academy of Arts and Sciences (KNAW). He currently is staff member of the Stratigraphy-Paleontology section at the
Faculty of Earth Sciences in Utrecht, the Netherlands. His current research interest focuses on paleoclimate variability in the annual to (sub)Milankovitch frequency bands and on the extension of the astronomical time scale into the Middle Miocene and the continental realm. He is secretary of the Subcommission on Neogene Stratigraphy (SNS), chairman of the Working Group on the Tortonian and Serravallian GSSP and member of the working groups on Cyclostratigraphy and the Miocene Time Scale.

**Selected Publications**


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**Maria Rose Petrizzo**

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**Curriculum Vitae**

Maria Rose Petrizzo was born on 18-11-1968 at Friedrichshafen (Germany). She obtained a Graduate Diploma (Laurea) in Geological Sciences at the Department of Earth Sciences of the University of Milano (Italy) in 1995 with a major in Stratigraphical Geology. In 1995 she worked as consultant at the same Department on research concerning micropaleontological studies on
planktonic and benthic foraminifera related to the Oligocene-Miocene facies of the Tertiary Piedmont Basin (Italy), and of the Cenozoic Marl s from the Tirana Trough (Albania). She completed her PhD thesis entitled “Planktonic foraminifera biostratigraphy and paleoclimatic-paleoceanographic evidence from middle Turonian to lower Campanian in the southern middle-high latitudes” at the same University in 1999. Afterwards she held two post-doctoral positions working on Cretaceous pelagic sediments from deep-bore-holes drilled by AGIP in the Adriatic Sea and ODP holes drilled in the Indian, South Atlantic and Pacific Ocean. Aim of the research was the correlation of biologic and chemical-physical events for constructing time scales. From August to October 2001 she was micropaleontologist (planktonic foraminifera) on board R/V JOIDES RESOLUTION - ODP Leg 198 Shatsky Rise “Extreme Warmth in the Cretaceous and Paleogene: a Depth Transect on Shatsky Rise, Central Pacific”. She currently has a post-doctoral position at the University of Milano. Her current research interest focuses on (1) high resolution integrated stratigraphy of Cretaceous and Paleogene pelagic sediments and correlation of the biologic events for understanding the evolution of the climate-ocean system; (2) Cretaceous southern mid-high latitudes sediments: correlation of bioevents across latitudes; (3) paleoceanographic and paleoclimatic reconstructions during the Cretaceous; (4) taxonomic studies on Late Cretaceous planktonic foraminifera; (5) planktonic foraminifera paleoecology and paleoceanography; (6) cyclic sedimentation expressed in Cretaceous pelagic sequences: applicability of the Milankovitch theory. Since October 2002 she is secretary and webmaster of the International Subcommission on Stratigraphic Classification (ISSC) of the International Commission on Stratigraphy (ICS).

Selected publications
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Curriculum Vitae  
Nick Riley was born on 28 February 1956. He obtained a BSc. in Geology and Zoology at the University of Bristol in 1977. In 1982 he completed his Ph.D in Geology at the University of Bristol on research concerning the early Visean ammonoids and trilobites (Craven Basin, UK).  


Stratigraphic Expertise. From 1980 up to joining the BGS senior Management Team I have been the main provider of stratigraphic interpretation to BGS’ projects and clients where advise has been required, or problems needed solving, with respect to understanding Carboniferous sequences. I have worked on sequences in N. America, Europe, China and SE Asia. My main areas of stratigraphic expertise have been in sequence stratigraphy and biostratigraphy (ammonoids, trilobites, bivalves, foraminifera). The output from this can be seen in the reference list supplied.  

Current Position: Programme Manager of Sustainable Energy & Geophysical Surveys.  

Selected Publications  
1996 Aitkenhead, N. & Riley, N. J. Kinderscoutian and Marsdenian successions in the Bradup and Hag Farm boreholes, near Ilkley, west Yorkshire. Proceedings of the Yorkshire Geological Society, 51,115-125. (See also PYGS 51, 374 for discussion.)  
Andreas Strasser

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Curriculum Vitae

Andreas Strasser was born on 3-09-1947 in Chur (Switzerland). He obtained a Diploma at the Institute of Geology in Zurich in 1972, and completed his Ph.D thesis on carbonate sedimentology at the Institute of Geology, Zurich in 1979. From 1979 to 1984 he was postdoctoral researcher at the Department of Geology and Palaeontology, Geneva, Switzerland. From 1985 to 1988 Lecturer at the same department. From 1989 to present Associate Professor at the Institute of Geology, Fribourg.

He participated in ODP Leg 143 in 1992 as sedimentologist. From 1986 to 1989 he was Secretary of the Swiss Geological Society, then Vice-president of the Swiss Geological Society 1989-92 and President (1992-1995). President of the Earth Sciences section at the Swiss Academy of Natural Sciences from 1989 to 1995; President of the Swiss Group for Geotope Protection (1994-96); President of the Swiss GEOForum (1998-2002); from 2002 to present President of the Fribourg Society of Natural Sciences.

Associate Editor of the “Journal of Sedimentary Geology” (1987-90); Associate Editor of “Facies” (1987-present); Associate Editor of the “Geologische Rundschau” (1994-01); Associate Editor for the “Bulletin Centre de Recherches Elf Explor. Production” (1998-00); Associate Editor for “Sedimentary Geology” (1999-present). General Secretary of the International Association of Sedimentologists from 1994 to 2002.
His principal research subjects are: High-resolution sequence stratigraphy, Cyclostratigraphy, Diagenesis, Sedimentology of Jurassic, Cretaceous, Pleistocene, and Holocene sedimentary deposits.

Selected Publications

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Curriculum Vitae
I obtained a degree in geology at the University of Sheffield, U.K. in 1975, and then a PhD from the University of Cambridge, working on the ‘Stratigraphy and Palaeontology of the Arenig area, north Wales, under the supervision of Professor Harry Whittington. From 1980 I worked for the British Geological Survey, initially as a field geologist working mainly on Mesozoic to Quaternary deposits of SE England, and then combined the roles of biostratigrapher (specializing in graptolites) and field geologist, working on early Paleozoic rocks of the central Welsh Basin. In 1994 I left the BGS and became a lecturer in stratigraphy and sedimentology at the Geology Department of the University of Leicester, U.K., continuing research into graptolite biostratigraphy and into radiometrically dateable diagenetic and metamorphic phases of mudrocks. I have been a member of
the Stratigraphy Commission of the Geological Society of London for over a decade, being its secretary for some years before taking over the chair last year. We have recently completed a revision of the UK stratigraphic guide (Rawson et al. 2002) and have a number of other projects in progress. In recent years we have worked closely with the Stratigraphy Committee of the British Geological Survey, particularly as regards reassessing and rationalising the UK lithostratigraphic framework.

My view on stratigraphy is that, worldwide, it is undergoing something of a renaissance. In recent years, there seems to have been an almost exponential increase in the resolution with which geological events of various kinds can be defined and correlated. This stratigraphic facility is key to the resolution of many of today’s most urgent geological questions, such as the disentangling of cause and effect in global climate change. The increasingly elaborate and multi-faceted nature of contemporary stratigraphy means, though, that the underlying framework of stratigraphic classification and nomenclature needs to periodically reconsidered and if necessary recast, so as to remain relevant and accessible to present and future generations of geologists. I would be happy to help in that process.

Selected Publications


2002 (contributor to) BRITISH GEOLOGICAL SURVEY. Saffron Walden. England and Wales. Sheet 205, Solid and Drift Geology. 1:50 000. (Keyworth, Nottingham, British Geological Survey.)


Working Group on Sequence Stratigraphy

- appointed in 1995
- coordinated by Amos Salvador
- consisting of 15 members:
  - Aubry M.-P.
  - Berggren W. A. *
  - Carter R. M. *
  - Christie-Blick N.
  - Hallam A.
  - Hardenbol J.
  - Miller K. G.
  - Owen D. E. *
  - Posamentier H.
  - Salvador A. *
  - Vail P.
  - Van Couvering J. A.
  - Van Wagoner J.
  - Watkins J. S.
  - Weimer P.

* ISSC members

Memos 1-23 distributed to WG members.

Since some ISSC members and/or WG members complained because the Majority and Minority Positions were not publicized, or because the decision to disband the Working Group was not discussed within the WG itself, or for whatever other reason, we reproduce here these documents, so that all ISSC members (old and new) are aware of the situation, also considering that of the four ISSC members that worked in the WG, three coauthored the Majority document.

From the AAPG Hedberg Research Conference “Sequence Stratigraphic and Allostratigraphic Principles and Concepts” Program and Abstract Volume, August 26-29, 2001, Dallas, Texas.

A proposed Bipartite Sequence Stratigraphic Nomenclature


We propose a bipartite sequence stratigraphic nomenclature in order to accommodate the varied needs and practices of stratigraphers. The proposed scheme acknowledges a clear case for both descriptive and interpretive concepts, and for shared ownership of the term “sequence”. Incorporation of the suggested nomenclature within the North American Stratigraphic Code will require a fundamental amendment of the Code.

Sequence – “a stratigraphic unit that is defined on the basis of bounding unconformities.” An unconformity is a composite surface of erosion and/or nondeposition separating older from younger sediment or rock bodies.
Two types of sequence are recognized, one descriptive (stratal sequence), and the other interpretive, involving bounding unconformities of specific character (depositional sequence).

**Stratal sequence** – “a stratigraphic unit that is defined exclusively with reference to bounding unconformities without regard to their character.”

**Depositional sequence** – “a relatively conformable succession of strata bounded by unconformities of subaerial erosion/nondeposition or their submarine equivalents and by genetically correlative conformities.” The intent of this definition is to permit the extension of a depositional sequence beyond the point at which one or both boundaries cease to be unconformable. The interpretation of a depositional sequence does not require correlative conformities to be present within a particular area of study.

**Additional Remarks**

The term sequence is sometimes used in a third sense, as a general designation for a sedimentary succession or stratigraphic unit (e.g., shoaling-upward sequence), and without reference to unconformities. Such usage is discouraged, particularly where confusion may arise with the more restrictive nomenclature proposed here. Alternatives, such as shoaling-upward succession, are available.

A stratal sequence is an unconformity-bounded unit equivalent to the synthem of Chang (1975) and Salvador (1987), and approximately equivalent to the allostratigraphic unit of the North American Commission on Stratigraphic Nomenclature (1983). An allostratigraphic unit is bounded by stratigraphic discontinuities that are commonly but not necessarily unconformities according to the way in which the term unconformity is conventionally used.

A depositional sequence is an unconformity-related unit, and essentially the sequence upon which modern sequence stratigraphy is based (Mitchum, 1977).

The proposed scheme departs in two important ways from the existing nomenclature of the North American Commission on Stratigraphic Nomenclature (1983). First, it specifically recognizes a category of stratigraphic unit that is defined on the basis of bounding surfaces rather than intrinsic material characteristics (e. g., lithology, remanent-magnetic properties, fossil content, etc.) or significance with respect to geological time (e. g., system, series, stage, etc.). In the present North American Stratigraphic Code, allostratigraphic units are classified out of necessity in the material unit category (see Table 1 of the Code). Moreover, while many sequence have time stratigraphic significance, they are not defined as a material reference for a span of time (chronostratigraphic units); and the existence of diachronous unconformities precludes universal interpretation of chronostratigraphy using sequence stratigraphy. Second, the proposed nomenclature recognized that sequence stratigraphy is fundamentally a procedure for interpreting patterns of sediment accumulation rather than a system for stratigraphic classification.

**Stratal sequence** is similar to existing categories of stratigraphic unit in the North American Stratigraphic Code because their selection is a matter of convention; depositional sequence differ from all existing categories because any interpretation is potentially falsifiable (it is subject to the scientific method).

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**Review of the Concepts of and Recommended Terminology for Unconformity-related Units**

**Salvador A.**

**Introduction.** After the publication of the second edition of the International Stratigraphic Guide in 1994, which made only brief reference to sequence stratigraphy, the International Subcommission on Stratigraphic Classification (ISSC) in view of the worldwide acceptance and use of sequence stratigraphy and its significant role in revitalizing stratigraphy, appointed in late 1995 a working group to review the basic concepts and terminology not only of sequence stratigraphy, but of all unconformity-related units. Following is a summary of its discussions and recommendations.

**First, a brief historical review.** Geologists have long recognized unconformities, disconformities, and evident gaps in the stratigraphic succession as some of the fundamental features of stratigraphy. Little effort was made, however, to recognize unconformity-bounded units as distinct stratigraphic units with their own specific terminology as “rock-stratigraphic units of higher rank than group, megagroup, traceable over major areas of a continent and bounded by unconformities of interregional scope”.

The great improvement in the resolution of seismic data during the 1960s and 1970s allowed Peter Vail and his EXXON co-workers to recognize in seismic sections truncations, overlaps, and other stratal relationships and, consequently, the detection and mapping of unconformities, the location of their basinward termination, and the extension of the unconformities along seismic reflectors beyond their termination into areas of apparent continuous deposition. On the basis of this new capability, Mitchum, Vail, and Thompson redefined sequence in 1977 as “a stratigraphic unit composed of a relatively conformable succession of genetically related strata and bounded at its top and base by unconformities or their correlative conformities”, the basic unit of seismic stratigraphy. What the correlative conformities were and how they could be recognized and mapped was not clearly specified.

This definition of “sequence” survived when seismic stratigraphy developed into sequence stratigraphy with the recognition of sequence on the basis of other stratigraphic data: subsurface wireline logs and samples, and outcrops.
These two somewhat different definitions of “sequence”, however, were not the only way in which the term had been used in stratigraphy. It had been frequently used, for instance, to refer to just any informal succession of strata.

Recognizing the usefulness of stratigraphic units bounded by discontinuities in the stratigraphic record, but not wanting to use the term “sequence” because of its various previous use, the North American Commission on Stratigraphic Nomenclature (NACSN) proposed in the 1983 North American Stratigraphic Code the terms “allostratigraphic units” (“allogroup”, “alloformation”, “allomember”) for stratiform bodies of sedimentary rock defined and identified on the basis of their bounding discontinuities in the stratigraphic record.

The ISSC, for similar reasons, used the term “synthem” of Chang (1975) in a note published in 1987 and in the second edition of the International Stratigraphic Guide (1994) for its unconformity-bounded units, like the NACSN, the ISSC did not favor the extension of the unconformity-bounded units beyond the basinward termination of the bounding unconformities.

The terminology dilemma. While the Working Group fully recognized the indisputable importance of unconformity-related units in stratigraphic work, it was faced by the existence of different schemes of nomenclature for essentially similar units: the sequence of Sloss, the sequences of seismic and sequence stratigraphy, the allostratigraphic units, and the synthsms. Three of them – the sequence of Sloss, the allostratigraphic units and the synthsms – are identical types of units; the sequences of seismic and sequence stratigraphy differ from the others only in that they may be extended beyond the basinward termination of the bounding unconformities.

We asked ourselves the following questions:

Were these four different terminologies for unconformity-related units necessary?

Was the inclusion of the correlative conformities in the definition of the sequences of seismic and sequence stratigraphy significant enough to justify a separate terminology?

Are the sequences of seismic and sequence stratigraphy objective units where bounded by unconformities but interpretive when bounded by the corresponding correlative conformities?

To answer these questions, it was necessary to examine and discuss the concept, definition, and procedures for the recognition and mapping of the correlative conformities, the features that apparently made the sequences of seismic and sequence stratigraphy different from the other three kinds of unconformity-related units.

The correlative conformities. The only previous indications of the nature of the correlative conformities were statements by Mitchum, Vail, and Thompson in 1977 that “the conformable part of a sequence are conformable and, therefore, synchronous in many places”.

The Working Group agreed to a more precise definition of a correlative conformity as a synchronous stratigraphic surface – a chronohorizon – that originates at the horizon in the stratigraphic section where the corresponding unconformity bounding a sequence dies out and extends into the area of apparent continuous deposition in the central part of a basin.

The diagnostic criteria for the recognition and mapping of a correlative conformity are those commonly used for dating and chronocorrelation: good-quality, high-resolution seismic reflector and biostratigraphic data, geomagnetic polarity reversal, tracing of beds and stratigraphic markers in the surface or the subsurface, etc.

When these diagnostic criteria are available, the recognition and mapping of correlative conformities as chronohorizons can be accomplished with a high degree of objectivity. When such criteria are not available, the correlative conformities cannot be recognized and the sequence becomes an unconformity-bounded unit identical to the sequence of Sloss, the allostratigraphic units, and the synthsms. In either case, the sequences of seismic and sequence stratigraphy are reasonably objective stratigraphic units.

The preferred terminology. In selecting the preferred terminology for naming unconformity-related units, it is important not to lose touch with reality – words are means of communication; those in common use, even if not well defined, are preferable to those that have received very limited use. In our case, the test of usage tells us that the allostratigraphic units and the synthsms have received very limited acceptance and use in stratigraphic work, 18 and 26 years, respectively, after they were first proposed. It would be unrealistic to believe that they will be received with any more enthusiasm in the future. “sequence”, on the other hand, is widely used today – though not always correctly.

The Working Group, therefore, favors to abandon the use of the terms “allostratigraphic units” and “synthsms,” and to unify the terminology of unconformity-related units by recognizing a single term – “sequence” – for all such units. To successfully accomplish this unification it is obviously necessary to propose a clear and precise definition of “sequence”; a definition sufficiently flexible to make the term useful at various levels of knowledge, under different circumstances, for different purposes and for all rock ages and sedimentary environments. It is our hope that this definition of “sequence” will be broadly accepted and used making possible successful international communication and more effective stratigraphic work;

Definition of sequence. Nine members of the Working Group favor a bipartite terminology for sequence: a descriptive unit – stratal sequence – and an interpretative unit – depositional sequence. This terminology will be discussed later in the conference by Nicholas Christie-Blick. Six other members – Jan Hardenbol, Henry Posamentier, Amos Salvador, Peter Vail, John Van Wagoner, and Paul Weimer – prefer the following single definition of sequence:

A sequence is a stratigraphic unit composed of a relatively conformable succession of genetically related rocks bounded by discontinuities in the stratigraphic record (unconformities) representing subaerial or submarine erosion and/or
nondeposition that are believed to have local or regional stratigraphic significance. A sequence can be extended beyond
the basinward limits of its bounding unconformities, when desirable and possible, along their corresponding correlative
conformities.
The recognition of the correlative conformities is not always possible and it is not essential, therefore, in the definition,
characterization, and mapping of a sequence.
If the case of the bounding unconformities of a sequence can be properly interpreted, and if it is judged to be valuable or
necessary in the definition of the sequence, it should be clearly stated and the evidence for such an interpretation should
be clearly discussed.

My own personal viewpoint is:
• that sequence stratigraphy is a real problem, because it is widely used by basin analysists as well as by regional geologists without a common set of internationally agreed-upon rules starting from the basic definition and identification of a sequence boundary to the numbering and hierarchic treatment of cycles;
• that at the Hedberg conference there was a strongly conflicting attitude between the strict followers of Peter Vail’s model and the others;
• that I strongly felt a kind of cultural shock when I realized that successful sequence stratigraphers familiar with silicoclastic deposits from passive continental margins, with calculations of subsidence rates and accommodation space, were unaware that the accommodation space concept does not really apply to the oceanic realm, where sediments are not continent derived, but result from the particle by particle accumulation of pelagic fall-out, where carbonate dissolution at depth occurs, where the rate of sedimentation is so low that the oceans cannot even be considered as sedimentary basins according to Bally’s terminology.

In conclusion ISSC cannot ignore the sequence stratigraphy issue: Florence 2004 could/should be the right place where to discuss how to handle the situation (see later).

Working Group on Cyclostratigraphy

• appointed in 1998
• consisting of:
  Fritz Hilgen
  Andreas Strasser
  Walther Schwarzacher
none of them was ISSC member.

They produced two reports and a questionnaire.
First report is included in Circular n. 97 (July, 2000) and accompanied by a questionnaire. It was distributed to a large mailing list of qualified stratigraphers, besides ISSC members. Responses to the questionnaire and comments were included in ISSC Circular n. 98 (October 2000) and n. 99 (July 2001). The topic was presented and discussed at the SEMP sponsored conference on cyclic sedimentation held in Sorrento (Italy) in the Spring of 2001. A second report by the WG was distributed in ISSC Circular n. 100 (January 2002), approximately one year ago asking for additional comments, but no comments arrived.
The second report (Appendix C to ISSC Circular n. 100) on “Concepts and definition in cyclostratigraphy “ is clear, simple and direct (but not exhaustive to my mind). “The term sedimentary cycle (as used in cyclostratigraphy) should be restricted to the repetitive change in stratigraphic record that have or are inferred to have a time significance”.

19
Methodology links to other branches in stratigraphy (sequence stratigraphy, event stratigraphy, geochronology), working definitions (of cyclostratigraphy, sedimentary cycle, astronomic time scale), suggestions for a formal codification of Milankovitch are briefly treated.

My impression is that “in order to reach a compromise that considers as many of the comments received as possible” (which by the way were in part very contradictory and confused) the three scientists lost some momentum.

All three members of the WG were invited to join ISSC. Hilgen and Strasser were pleased to accept, whereas Schwazacher declined. His classic book on cyclostratigraphy and the Milankovitch theory is and will always be a milestone. It was published in 1993, approximately one century after Gilbert 1895 inspired paper on Cretaceous cyclically bedded deposits of the Western Interior.

In conclusion the WG is officially disbanded but cyclostratigraphy is one of the major topics of the Florence 2004 Workshop. At the Florence 2004 workshop we propose to invite three new ISSC members to present keynote lectures directly linked to the topic:
- Fritz Hilgen on astronomically controlled cyclicity in pelagic and continental Neogene successions and ATS,
- Andreas Strasser on cycles and sequences expressed in carbonate platforms and carbonate ramps in the Mesozoic,
- Nick Riley on various scale cycles expressed in marginal seas of cratonic areas in the Paleozoic (Carboniferous).

And look for what seems to me a real scientific event.

**Project on “Glossary of Stratigraphic Terms”**

The preparation of a Glossary on stratigraphic terms was initiated under Alberto Riccardi’s chairmanship as mentioned in the ISSC Annual Report 2002: “Preparation of a glossary of stratigraphic terms in several languages is being organized under the direction of Prof. Ivo Chlupac (Czech Republic). The Glossary has already been translated into several languages (Spanish, Russian, German, Portuguese, Bulgarian, Czech, Slovak, Catalan). It is expected that the Glossary in English, French, Spanish, Russian, Italian, German and Portuguese will be ready for the end of 2002.”

Unfortunately Prof. Ivo Chlupac passed away last November (see obituary), and, notwithstanding our strenuous efforts, we are enable to have direct information from the Charles University of Prague on who is taking over the Glossary project in his department and at the same time we don’t want to drop the project which seems to be well in progress.

We do hope to receive more information from the scientists who have already translated the glossary and were in contact with Prof. Chlupac, in fact from a letter dated July 20, 2002 of Prof. Chlupac to Prof. Riccardi he wrote that he had received complete translation from the following representants of the official national stratigraphic body:
1) National Commission on Stratigraphy of Bulgaria (Acad. T. Nicolov),
2) Brazilian National Stratigraphic Committee (Prof. S. Petri),
3) Interdepartmental Stratigraphic Committee of Russia (Prof. A. I. Zhamoida),
4) Comit. Espanol de Estratigrafia (Prof. S. Requant),
5) Stratigraphic Commission of Germany (Prof. F.F. Steininger).

Interested scientists, please, communicate!!!!
“POST-HEDBERG DEVELOPMENTS IN STRATIGRAPHIC CLASSIFICATION” AN ISSC WORKSHOP OF THE 32° INTERNATIONAL GEOLOGICAL CONGRESS TO BE HELD IN FLORENCE IN AUGUST 2004.

MOTIVATION - STATE OF THE ART – PURPOSE - CALL FOR PAPERS

The idea to organize a real scientific meeting for old and new members of the once upon a time legendary Subcommission on Stratigraphic Classification came to me when I found myself exposed to the responsibility of driving an important group of scientists, when Alberto Riccardi had to withdraw from the position because this was incompatible with his new appointment as councilor of IUGS. My previous appointment as vice-chair was a kind of a sine cura: indeed Alberto did everything by himself, from the Museo de La Plata.

Having been for decades member of ISSC, I was aware of the difficult relationship with the parent body, of the apparent decline of stratigraphy, of the passive attitude that many members showed.

Being myself chairman of the Italian Commission of Stratigraphy and responsible of a project sponsored by the National Geological Survey that involved the validation of lithostratigraphic units defined in Italy and the compilation of a new Italian Guide of Stratigraphic Terminology and classification, I know very well how difficult it is to reach a consensus and to draw a line discriminating what is correct from what is unacceptable!!!

It took almost four years to complete the new Guide, which was delivered to the Geological Committee just a week ago!

My view point is: if Geology is a core business of IUGS, if Stratigraphy is a core business of Geology, then ISSC has to be a core business of Stratigraphy and of the Stratigraphic Commission!

Having participated to the Urbino meeting in June, 2002 (see my report on ISSC Circular n. 101), I realized that a re-visitation of Hedberg’s concepts was timely and could not be postponed anymore. However, I was hesitant to promote an initiative with an apparently “dormant” membership. But the numerous, positive, some enthusiastic responses received after my first “Important message” of July, 2002, motivated my request to held a Special Symposium on “Post-Hedberg developments in stratigraphic classification” (see below).

Milano, September 25, 2002
To: Chairman Scientific Planning Committee, Firenze 2004 IGC
From: Maria Bianca Cita, Chairman International Sub-commission on Stratigraphic Classification
Subject: request to held a Special Symposium on "post-Hedberg developments in stratigraphic classification".

Starting its activity over 50 years ago, in 1951, the Subcommission of Stratigraphic Classification predated all other Subcommissions of ISC. Through the strenuous, intelligent and diplomatic efforts of its founder and first Chairman Hollis D. Hedberg, a successful oil company manager and an inspiring professor of stratigraphy, an internationally agreed-upon guide to stratigraphic classification was created, published (in 1976) and disseminated worldwide. It took over 20 years and a lot of negotiated compromise to reach a version that was acceptable to the various schools of thought: a standard of reference with clearly expressed rules to define and recognize the various categories of stratigraphic units.

A second, updated edition of the International Guide was published in 1994 (A. Salvador editor), and an abridged version of the Guide (A. Salvador and E. Murphy editors) was published in 1999 in "Episodes", whereas several national guides appeared, in different languages (i.e. Russian, Lithuanian, Italian, French, German etc.)

Since Hedberg’s first International Guide, new frontiers for Stratigraphy have been provided by unprecedented exploration of:
- the ocean floor (stratigraphy of deep-sea cores)
- continental lakes (stratigraphy of lake cores)
- km-thick high latitude glaciers (stratigraphy of ice cores).

New techniques were first developed, or further refined (i.e. paleomagnetic stratigraphy, isotopic stratigraphy, geochronology, astronomically controlled cyclostratigraphy, seismic stratigraphy originating sequence stratigraphy). Serious conceptual problems lay behind some of these branches of stratigraphy, and are debated in conferences and in publications.

Lithostratigraphy, that is the first and eventually the simplest category of Hedberg's classification, presents serious problems in practical applications, as resulting from the legends of the geological maps published by National Geological Surveys, by Lexicons (existing and in progress), by the difficulty to apply Hedberg's rules to non-sedimentary, non-layered rocks.

Purpose of the planned symposium is to focus the various problems by means of a series of INVITED review-papers offered by leading scientists.

Indeed, a general meeting of the International Commission of Stratigraphy held in Urbino (Italy) in June, 2002, clearly showed that the progress of the time-scale is tangible, but both theoretical and practical problems in stratigraphic classification MUST BE ADDRESSED NOW.

Hoping that this request is accepted, I am with best personal regards,

Maria Bianca Cita
Chairman of ISSC

From the ISSC Annual Report 2002:
“Strenuous efforts by the new Chairman are focussed to call a Special meeting (Symposium? or Workshop?) of ISSC at the 2004 IGC in Florence to discuss all critical points and dress a new long-term research plan, based on a clarified and widely international background.”

The proposal was accepted by the Scientific Committee as a during-congress Workshop with a number of participants 30-100, no subscription fee, one full day allocated with the greatest freedom to organize the workshop, co-convenors are Maria Bianca Cita and Alberto Riccardi.

We want to make it clear that the ISSC workshop is directed to check the acceptance status of the present classification (International Guide) and to discuss what type of changes and new avenues of classification stratigraphers are looking for.

What we are looking for are good examples showing what is accepted or upholding the status-quo. We would like to have a few keynote lectures (see page 19), position papers from National Stratigraphic Commissions and/or Geological Surveys, free contributions.

We are open to new ideas and – after receiving your responses – we will look for an International Journal for publication of the outcome of the workshop.

Please let us know ASAP if you want a formal, personal invitation which might help your participation to the 2004 IGC in Florence.

Remember that in order to participate, you have to:

- pay the Congress subscription fee,
- clearly indicate that you want to participate to Workshop DWO 13,
- submit an abstract before the deadline of November 1, 2003, as indicated in the Second Circular, which will be distributed next month.
ELECTIONS

According to the new Statutes (see page 5) two chairs and two optional vice chairs of a Subcommission of ICS are proposed to ICS after appropriate ballot within each Subcommission. From these candidates the new officers are subsequently elected by the Voting Members of the Commission ICS by ballot to be mailed by the general secretary of ICS not later than 12 months prior to the next IGC.

That means that two chairs and two optional vice chairs must be nominated after appropriate ballot within each Subcommission not later than April 2003, as the next IGC will be held in August 2004. Please, make your nominations before March 31, 2003 and send them to the ISSC Secretary (e-mail: mrose.petrizzo@unimi.it).

The full list of members is available on the ISSC web page (http://www.geocities.com/issc_arg).

A Special Newsletter with the list of the approved new members, that might also be proposed as chair and vice chair of the ISSC, will be mailed to all the ISSC members by March 10, 2003.

NOTICE: if you retain from submitting your nominations in due time, you risk to be dropped from the member list, as indicated in point 5.1 of the ICS Statutes (see page 4).

LIST OF THINGS TO BE DONE

1) Within February 2003, approve new members.


4) Before November 1, 2003, subscribe to 32° IGC Florence 2004, indicating interest to participate to DWO 13 Workshop, and send an abstract.
Obituary of Prof. Ivo Chlupac

With regret I would like to announce that November 7th, 2002, my husband, professor Ivo Chlupac, passed away.

Despite of his regretful health condition, he has spent most of time working on many subjects from his beloved field of geology and palaeontology.

Until the very last moment of life
He has devoted all his energy to research
And bringing-up new generation of young students and scientists.

Prague, November 25th, 2002

Olga Chlupacova
Call for discussions

Call for papers

Post-Hedberg developments in stratigraphic classification

ORBITAL FORCING IN GLACIAL VERSUS NON GLACIAL TIMES

OCEANIC ANOXIC EVENTS

MELISSIAN SALINITY CRISIS

32° IGC

ARE LITHODEMIC UNITS A GHOST OR A REALITY?

Marginal seas in Cretaceous and Cenozoic times

cyclic sedimentation

NEOGENE CLIMATIC DETERIORATION

MASS EXTINCTIONS