

INTERNATIONAL UNION OF GEOLOGICAL SCIENCES
INTERNATIONAL COMMISSION ON STRATIGRAPHY



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January 2009

Consolidated Annual Report for 2008

Summary and Budget Request

Compiled by Stanley C. Finney, *chair*, and Paul R. Bown, *secretary-general*, of ICS
Long Beach (USA) and London (UK)

Summary

The new ICS executive (Chair Finney, Vice Chair Peng, and Secretary-General Bown) held its first formal meeting in Houston, Texas at the Annual Meeting of the Geological Society of America in October 2008. This meeting provided the first opportunity for the new executive officers to discuss and determine their primary concerns and desired goals for ICS during their terms of office. These are summarized in the annual report, particularly in sections 8 and 10.

The primary concern of the ICS executive is to restore the reputation of ICS and to further enhance it. A major step in doing so is to first resolve the controversy regarding the Quaternary System and Pleistocene Series and the desire by the INQUA community for re-definition. It is critical that this matter be handled in an open, deliberative process, which is being done and should be completed in the next several weeks. Collaboration with the greater geoscience community is another imperative and will be handled by establishing regular communication with national stratigraphic commissions and by redesign and rejuvenation of the ICS website and the websites of the ICS subcommissions.

The ICS executive will work diligently with the ICS subcommissions to ensure that greater progress is made on selection of GSSPs for those stages (series and systems) with boundaries still to be defined. The base Jurassic and base Cretaceous will be given highest priority. An ICS workshop is planned for May 2010 to focus on GSSPs with the goals of evaluating their usefulness and the success of the process and as a means of stimulating selection of the remaining GSSPs.

A wealth of data and information has been obtained from the study of hundreds of stratigraphic successions worldwide during the past 35 years, and it is imperative that these data be preserved, stored in databases, and synthesized in formats readily accessible by the geoscience community, most importantly for educational uses. The Executive Task Group on Stratigraphic Information is making great progress in doing so. This information will be synthesized in charts,

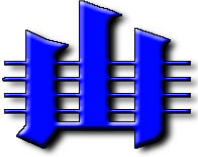
tables, books, posters, and other products, but it must also be accessible via the internet, and the ICS website must be the primary portal. This requires that the ICS website be redesigned and rejuvenated.

Although the standard classification of chronostratigraphic and geochronologic terminology was established in 1881 (at the 2nd International Geological Congress), inconsistent usage plagues stratigraphic writings. This issue must be addressed by ICS, particularly by the Subcommittee on Stratigraphic Classification. In addition, the *International Stratigraphic Guide* is viewed by many as a somewhat boring document with little educational value. Accordingly, the Subcommittee on Stratigraphic Classification is producing a series of papers that elucidate the major subdisciplines of stratigraphy. This is a most valuable product that must be completed within the next two years.

These are most worthy goals of ICS, goals that have the highest priority of the ICS executive.

Budget Request and Justification

The ICS executive requests a substantial augmentation to its budget for 2009. The support from IUGS has decreased significantly in the last few years. Last year's budget of ~\$36,000 included ~\$14,000 to support the attendance of subcommittee chairs at the 33rd IGC, which greatly reduced the amount available for the primary mission of ICS. The work of ICS is carried out largely in the subcommittees, and the funding levels of the past few years have not allowed for travel support necessary for field meetings to examine potential GSSP sections. Having served as Chair of the Ordovician Subcommittee for eight years and having moved it successfully towards completion of GSSPs for all its stages, I know that such field meetings are essential for making progress. Accordingly, the budget request for 2009 includes significantly increased funding for the activities of boundary working groups within the subcommittees. Funding requested for the ICS executive will allow the Chair, Vice Chair, and Secretary General to not only meet once each year (annual executive meetings) but also to attend subcommittee meetings where their presence often fosters progress on GSSP decisions, particularly on boundaries that are difficult for a variety of reasons. Also part of the funds requested for the executive will be used for planning for the ICS workshop in May 2010, for which significant funding will be requested in next year's report. Substantial funding is also allocated for the Executive Task Group on Stratigraphic Information, which requires the services of information technology experts, as well as student assistants for data entry, for graphic specialists to prepare ICS products, and for printing costs for ICS products.



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January 2009

1. TITLE OF CONSTITUENT BODY

International Commission on Stratigraphy (ICS)

Summary and compilation of subcommission reports submitted jointly by:

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2. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

Objectives

The International Commission on Stratigraphy (ICS) is a body of expert stratigraphers founded for the purpose of promoting and coordinating long-term international cooperation and establishing standards in stratigraphy. Its principal objectives are:

- (a) Establishment and publication of a standard global stratigraphic time scale and the preparation and publication of global correlation charts, with explanatory notes.
- (b) Compilation and maintenance of a stratigraphic data base center for the global earth sciences.
- (c) Unification of regional chronostratigraphic nomenclature by organizing and documenting stratigraphic units on a global database.
- (d) Promotion of education in stratigraphic methods, and the dissemination of stratigraphic knowledge.
- (e) Evaluation of new stratigraphic methods and their integration into a multidisciplinary stratigraphy.

- (f) Definition of principles of stratigraphic classification, terminology and procedure and their publication in guides and glossaries.

Fit within IUGS Science Policy

The objectives satisfy the IUGS mandates of:

- Fostering international agreement on nomenclature and classification in stratigraphy.
- Facilitating international co-operation in geological research.
- Improving publication, dissemination, and use of geological information internationally.
- Encouraging new relationships between and among disciplines of science that relate to geology worldwide.
- Attracting competent students and research workers to the discipline.
- Fostering an increased awareness among individual scientists worldwide of what related programs are being undertaken.

In particular, the current objectives of ICS relate to three main aspects of IUGS policy:

- (a) Development of an internationally agreed scale of chronostratigraphic units, fully defined by Global Stratotype Sections and Points (GSSPs) where appropriate and related to a hierarchy of units to maximize resolution throughout geological time.
- (b) Promotion of international consensus on stratigraphic classification and terminology, which is essential for advancement of earth-science research and education.
- (c) Establishment of frameworks and systems to encourage international collaboration in understanding the evolution of the Earth.

3. ORGANIZATION

ICS is organized in two types of constituent bodies: Subcommissions for longer-term study, and Committees for more limited, shorter-term tasks. ICS is managed by the Executive Committee, which consists of elected and appointed officers. The current structure of ICS consists of the Executive Committee, an executive task group (Stratigraphic Information Services), and 15 Subcommissions that deal with the major chronostratigraphic units and aspects of stratigraphic classification and time scales.

Subcommissions:

Quaternary	Triassic	Ordovician
Neogene	Permian	Cambrian
Paleogene	Carboniferous	Ediacaran/Cryogenian
Cretaceous	Devonian	Precambrian
Jurassic	Silurian	Stratigraphic Classification

The *Executive Task Group*: Stratigraphic Information Services had been approved for Subcommission status in 1997, but the officers were inactive and little was produced. More recently, previous ICS Secretary-General Jim Ogg was appointed to lead the task group and as its gains contributing members it should be considered for Subcommission status, especially considering its many, important products, and plans to increase its educational role.

The reports of each Subcommission and the task group are appended to this ICS summary compilation.

The subcommissions of ICS together have about 350 titular members. When the corresponding members of Subcommissions are added, several thousand stratigraphers worldwide participate in the activities of ICS. In addition, many countries have national stratigraphic committees, with which ICS establishes or maintains contacts. The members of the Full Commission (i.e. the 3 members of the Executive and the officers of the 15 Subcommissions and task group) come from 17 countries: Australia, Belgium, Canada, China, Denmark, France, Germany, Great Britain, Hungary, Italy, Morocco, Netherlands, Poland, Spain, Sweden, Switzerland and USA. The voting memberships of the aggregate subcommissions include at least 30 more nations.

Websites:

ICS main site	www.stratigraphy.org
Quaternary	www.quaternary.stratigraphy.org.uk
Neogene	www.geo.uu.nl/SNS
Paleogene	wzar.unizar.es/isps/index.htm
Lutetian GSSP task group	wzar.unizar.es/perso/emolina/ypresian.html
Jurassic	http://jurassic.earth.ox.ac.uk/
Triassic	paleo.cortland.edu/sts/
<i>Albertiana</i> newsletter:	www.bio.uu.nl/%7Epalaeo/Albertiana/Albertiana01.htm
Permian (newsletter)	www.nigpas.ac.cn/permian/web/index.asp
Link to Permian research:	www.geo.ucalgary.ca/asrg
Devonian	www.unica.it/sds/
Silurian	www.silurian.cn/home.asp
Pre-2005 newsletters	iago.stfx.ca/people/mmelchin/SILURIAN.HTM
Ordovician	www.ordovician.cn
GSSP discussion site	seis.natsci.csulb.edu/ISOS
Cambrian	www.uni-wuerzburg.de/palaeontologie/ISCS/index.html
Precambrian	www.stratigraphy.org/precambrian
Stratigraphic Classification	http://users.unimi.it/issc
Stratigraphic Information Systems	
Main site	www.stratigraphy.org
CHRONOS database	www.chronos.org
(concept posted at:)	www.eas.purdue.edu/chronos
<i>PaleoStrat</i> database network	www.paleostrat.org

ICS Executive Officers for 2008-2012:

Chair: **Stanley Finney** (California, USA)
Vice-Chair: **Shanchi Peng** (Nanjing, China)
Secretary: **Paul Bown** (London, UK)

ICS Subcommittee officers:

A full listing of current officers (with addresses, telephones, e-mails) is at the end of this main ICS report. The individual subcommission reports include a listing of all voting members (typically 20 in each subcommission).

4. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

Only a few of the subcommissions have formal financial contributions from external sources other than IUGS (through ICS), and these are listed in the individual reports. Some activities that are associated with ICS goals, such as distributing charts of the Geologic Time Scale and placing this information onto public websites, have received some support from petroleum companies and the National Science Foundation of USA through its CHRONOS database consortium funding. Informally, every officer and member of ICS donates their own time, office space, institutional facilities, and other components to the activities of the organization. No officer or executive receives any salary compensation from IUGS or other ICS funds. Indeed, most officers personally contribute toward their own travel and operational expenses.

5. INTERFACES WITH OTHER INTERNATIONAL PROJECTS

Active and highly fruitful interfaces with many international organizations and geo-projects are a standard feature of ICS activities. ICS maintains a strong link with the International Quaternary Association (*INQUA*) Commission on Stratigraphy regarding the stratigraphy of the Quaternary, and to Commission for the Geological Map of the World (*CGMW*) in Paris regarding standardization of chronostratigraphy and its color scheme on charts. ICS has an active link to the NSF (Washington) scientific database initiative for Earth history called *CHRONOS*, and to the International Association for Mathematical Geology (*IAMG*). ICS subcommissions are traditionally affiliated with a considerable number of **IUGS** and **IGCP** activities. Details of these are given in each subcommission's annual reports. ICS members maintains active links with international research groups, including The Micropalaeontology Society (**TMS**), the North American Micropaleontology Society (**NAMS**), International Nannoplankton Association (**INA**) and the Association of American Stratigraphic Palynologists (**AASP**), and international paleontological research groups on Graptolites, Conodonts, Ammonites, Radiolarians (**Interrad**), Nannofossils, Foraminifers, etc. There are close links between many ICS stratigraphers with the International Ocean Drilling Project (**IODP**). The latter has undertaken a major re-organization with focus on ultra-deep drilling using riser systems (in Japan 's subduction zones), non-riser high-resolution drilling (the JOIDES Resolution is set to initiate new expeditions in March 2009), and mission specific drilling platform expeditions. ODP cores routinely test the global correlation potential of a great number of bio-events since the Jurassic, and this record is vital to develop integrated timescales at several scales of resolution, and global paleo-climate models. The designation of GSSPs necessitates close interaction with local and international groups concerned with conservation, such as **UNESCO** (Geoparks Program), **IUGS** (Geosites Program) and **ProGEO** (Geosites and Geoparks initiatives).

6. CHRONOSTRATIGRAPHIC STAGE AND SERIES NAMES AND DEFINITIONS ESTABLISHED IN ICS SINCE 2000

Quaternary	Base Holocene Series
Neogene:	Base Zanclean Stage (Base Pliocene Series) Base Messinian Stage Base Tortonian Stage Base Serravallian Stage
Paleogene:	Base Ypresian Stage (Base Eocene Series) Base Thanetian Stage Base Selandian Stage
Cretaceous:	Base Maastrichtian Stage Base Turonian Stage Base Cenomanian Stage
Jurassic:	Base Bathonian Stage Base Aalenian Stage Base Pliensbachian Stage Base Sinemurian Stage
Triassic:	Base Carnian Stage Base Ladinian Stage Base Induan Stage (Base Triassic System)
Permian:	Name and Base Changhsingian Stage Name and Base Wuchiapingian Stage and Lopingian Series Base Capitanian Stage Base Wordian Stage Base Roadian Stage and Guadalupian Series
Carboniferous:	Mississippian and Pennsylvanian subsystem Names and Lower, Middle and Upper series subdivision of each and stage nomenclature for each Base Viséan Stage
Silurian:	Base redefinition for Rueddian Stage (Base Silurian)
Ordovician:	Name and Base Hirnantian Stage Name and Base Katian Stage Name and Base Sandbian Stage Name and Base Dapingian Stage Name and Base Floian Stage Base Tremadocian Stage
Cambrian:	Name and Base Furongian Series Name and Base Paibian Stage Name and Base Guzhangian Stage Name and Base Drumian Stage Name Terreneuvian Series Name Fortunian Stage

Neoproterozoic: Name and Base Ediacaran System

7. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2008

Full Commission

- During 2008, ICS made significant progress on its primary ongoing objective of standardization of the International Chronostratigraphic Scale with GSSPs being approved by ICS for the Viséan, Carnian, Bathonian, Selandian, and Thanetian stages and the Holocene Series.
- In an effort to resolve the controversy regarding the definition of the Quaternary System and Pleistocene Series, a public discussion session was held at the 33rd IGC to solicit proposals and opinions on all sides of the issue. Subsequently the Quaternary and Neogene subcommissions voted on various proposals for redefinition of the Quaternary and Neogene systems and the Pleistocene and Pliocene series.
- *The Concise Geologic Time Scale* was published by Cambridge University Press as an IUGS/ICS product and was available for purchase at the 33rd IGC.
- ICS and its subcommissions sponsored eight symposia, one workshop and one field excursion at the 33rd IGC and the ICS and all subcommissions held business meetings at the Congress.
- A new executive was elected and so too were new chairs of 7 of the 15 subcommissions.

Quaternary Subcommission

- Holocene GSSP ratified by IUGS.
- Middle-Upper Pleistocene Subseries boundary approved by ICS but failed in vote for ratification by IUGS.
- Subcommission voted to approve redefinition of the bases of the Quaternary System and Pleistocene Series to base of Gelasian Stage and to reject proposal to extend Neogene to present.
- A special issue of *Episodes* devoted to the Quaternary was published in June 2008.
- The subcommission website was expanded and is supported by the *Journal of Quaternary Science* and *Boreas*.

Neogene Subcommission

- A new website with comprehensive GSSP information and illustrations was produced.
- Astronomic tuning of the Mediterranean GSSP sections continued, providing unprecedented stratigraphic resolution and correlation potential.
- An integrated stratigraphic study was completed of the La Vedova (Italy) section, which is the most promising candidate boundary stratotype section for the Langhian Stage GSSP.
- Subcommission voted to approve proposal to extend the Neogene to the present, to redefine rank of Quaternary, and to retain Vrica GSSP as base of Pleistocene Series.

Paleogene Subcommission

- IUGS ratification of Selandian and Thanetian GSSPs.
- Publication of the Ypresian GSSP in *Episodes*.
- The long-awaited publication of the El Kef GSSP for the base Danian Stage (Cretaceous-Paleogene boundary) in *Episodes*, and acceptance in *Episodes* of paper on auxiliary sections and correlation of the Cretaceous-Paleogene boundary.

- Documentation of integrated stratigraphies for primary candidate sections for Lutetian and Chattian GSSPs.
- Activation of two new working groups on Calcareous Nannofossils and Deep Water Foraminifera.

Cretaceous Subcommittee

- Symposium session “Stratigraphic subdivisions of the Cretaceous System: State of the art”, held at the 33rd IGC, presented progress on Cretaceous stage boundaries.
- 1st International Meeting on Correlation of Cretaceous Micro- and Macrofossils, Natural History Museum, Vienna, 16-18 April 2008.
- The working group on the Jurassic-Cretaceous boundary and the Berriasian GSSP meet in Marseille, 12-13 April 2008 and previously met in Bristol, UK, 2007, is making real progress towards this critical GSSP. The working group will next meet in Milan in 2009.
- The working group on the Valanginian Stage completed isotopic and additional biostratigraphic studies of the two candidate stratotype sections.
- The working group on the Hauterivian Stage finished a draft GSSP proposal for the section at La Charce, France.
- The working group on the Barremian Stage finished a draft GSSP proposal for the only candidate section under consideration, which is located in Spain.
- A wealth of revised biostratigraphic data, as well as carbon isotope curves and cyclostratigraphy, has been compiled for the base-Aptian GSSP.
- The proposal on the base-Albian GSSP did not receive a majority vote of the working group and is being revised.
- The working group on the Coniacian has agreed to propose the Salzgitter-Salder-Slupia Nadbrzezna composite section as the stratotype with the boundary placed at the level of first appearance of *C. deformis erectus*.
- The working group on the Santonian Stage is voting on the Olazagutia (Spain) GSSP proposal.
- The base-Campanian GSSP is being considered at the Waxahachie dam spillway section, but progress on the proposal was delayed by the need to investigate land ownership issues.

Jurassic Subcommittee

- Ratification by IUGS of base-Bathonian GSSP.
- 5th Symposium of IGCP 506 (Marine and Non-marine Jurassic: global correlation and major geological events), Hammamet, Tunisia, 28-31 March 2008.
- “Jurassic Coast” World Heritage Site, ongoing consultations and discussions between subcommittee members and site management.

Triassic Subcommittee

- Ratification by IUGS of base-Carnian GSSP.
- Selection of GSSP sections, levels, and primary markers for Toarcian, Callovian, and Kimmeridgian stages.
- Approval by subcommittee of GSSP for Triassic-Jurassic boundary (base-Hettangian Stage), and submission to ICS.
- “The Triassic Climate”, international workshop, Bolzano/Bozen, Italy, 3-6 June 2008.

- “Upper Triassic subdivisions, zonations and events”, international workshop, Bad Goisern, UNESCO world heritage site Dachstein-Hallstatt/Salzkammergut, Austria, 28 September-2 October 2008.
- Selection of biomarker for base-Olenekian, base-Anisian, and base Rhaetian GSSPs.
- Identification of two candidate stratotype sections for base-Norian GSSP.

Permian Subcommission

- International Field Expedition to the Sydney Basin, January 2008.
- Samples collected in 2007 from candidate GSSP sections for lower Permian (Cisuralian) stages were processed for stable-isotope geochemistry, radioisotopic ages, and biostratigraphy.

Carboniferous Subcommission

- Joint task group was established to redefine Devonian-Carboniferous boundary.
- Base Viséan Stage GSSP ratified by IUGS.
- Task Groups on GSSPs for Serpukhovian, Moscovian, Kasimovian, and Gzhelian stages evaluation biohorizons and candidate stratotype sections for boundaries.

Devonian Subcommission

- Formation of new boundary working group for Devonian-Carboniferous boundary. Working group will include members selected from both Devonian and Carboniferous subcommissions.
- Extensive studies completed on new section (Zincilban, Uzbekistan) to serve as GSSP for base Emsian Stage, which must be redefined.
- Global substages approved by ISDS for Givetian and Frasnian stages.

Silurian Subcommission

- The graptolite biostratigraphy used to correlate the GSSP for the base of the Silurian System (and the Llandovery Series and Rhuddanian Stage) was revised, and that revision, which is used to characterize the stratigraphic position of the GSSP was approved by ICS and ratified by IUGS.
- Report was presented on restudy of the GSSP for the base of the Wenlock Series.

Ordovician Subcommission

- Following completion of approval of GSSPs for all Ordovician stages and series, the paper “A new chronostratigraphic classification of the Ordovician System and its relations to the main regional series and stage” was prepared and published by Bergström, Chen Xu, Gutiérrez-Marco, and Dronov in *Lethaia*, v. 42 (2009).
- A color chart - *The Ordovician Time Table* - has been prepared and is ready for publication.

Cambrian Subcommission

- Potential stratotype sections have been proposed or are currently under study for GSSPs for Stage 5 (and Series 3), Stage 9, and Stage 10. Voting in the Subcommission will take place in 2009. Selection of these GSSPs will complete the upper half of the Cambrian System.
- The 13th International Field Conference on Cambrian Stage Subdivision, Siberian Platform, Western Yakutia was held in August 2008 and promoted important discussion required for progress on defining GSSPs for the lower half of the system.

Neoproterozoic (Ediacaran and Cryogenian) Subcommittee

- Subcommittee-sponsored field meeting: Cryogenian-lower Ediacaran development of the Great Otavi Bank, Namibia, mid-June, 2008.
- IGCP 512-sponsored field meeting: Neoproterozoic glacial and associated facies in the Varanger area, 33rd IGC, July 29 – Aug. 5, 2008.
- IGCP 512-sponsored symposium Stratigraphic correlation of Neoproterozoic strata and IGCP493 sponsored symposium Rise and fall of the Ediacaran (Vendian) biota at 33rd IGC.
- Swedish Workshop for Ediacaran Acritarch Taxonomy, Uppsala, Sweden, 18-21 August 2008
- In informal ballot, 84% of subcommittee members favor defining basal Cryogenian System at a GSSP directly below oldest Neoproterozoic glacial deposits.

Precambrian Subcommittee

- Survey of voting members demonstrated strong support for formalizing current subdivision of the Archean with boundaries defined by GSSPs, where possible, and by GSSAs where GSSPs cannot be established.
- Workshop on Precambrian subdivision at Australian Earth Sciences Convention, Perth, Western Australia.
- Field Excursion in Western Australia to potential GSSP site for Archean-Proterozoic boundary, May 2008, and collection of samples from boundary interval.

Stratigraphic Classification Subcommittee

- Publication in *Newsletters on Stratigraphy* of “Chemostratigraphy” by Weissert et al., the second in a series of publications that elaborate on the major subdisciplines of stratigraphy.
- Formation of task groups to produce publications on Biostratigraphy, Chronostratigraphy, Lithostratigraphy, Magnetostratigraphy, and Sequence Stratigraphy.
- “New Developments in Stratigraphic Classification” and “Plio-Pleistocene and Global Change”, subcommittee-sponsored symposia at 33rd IGC.

Stratigraphic Information Task Group

- *Concise Geological Time Scale 2008* published by Cambridge University Press.
- The poster “*History of the Earth*”, an ICS contribution for the “International Year of Planet Earth” was printed and widely distributed.
- The poster “*A Geologic Time Scale 2008*” was prepared and printed in coordination with UNESCO Commission for the Geologic Map of the World. The first printing was sold out at the International Geological Congress (Oslo, August, 2008).
- The “*International Stratigraphic Chart*” showing all ratified GSSPs is freely available through the International Commission of Stratigraphy website (www.stratigraphy.org).
- “*TimeScale Creator*” (Version 4 released in March, 2008 – Free JAVA suite is our continuously-expanding “flagship” database-visualization system with hyperlinks to our stratigraphic-information website (www.stratigraphy.org)).

8. CHIEF PROBLEMS ENCOUNTERED IN 2008

Full Commission

- Funding for ICS decreased significantly over the last four years. As a result, almost no travel money is available for members of boundary task groups, which greatly impedes progress on GSSPs.
- Stratigraphy is given low priority for funding by national granting agencies, thus making it difficult, if not impossible, to obtain support research necessary to propose GSSPs.
- The removal of the Quaternary System from the International Chronostratigraphic Chart/Geologic Time Scale in 2004 and subsequent unsuccessful attempts to reinstate it with a revised definition greatly diminished the reputation of ICS in the geoscience community, caused great animosity, and led to a serious breach of trust between the IUGS EC and the ICS executive.
- New names proposed for subdivisions of some systems (e.g. Cambrian and Ordovician) has caused concern among some in the geoscience community who do not understand the underlying reasoning and what they consider to be a lack of consultation.
- Stratigraphic terminology, particularly the inconsistent and mixed usage of chronostratigraphic versus geochronologic terms, results in confusion even those these terms were precisely defined in 1881 at the 2nd International Geological Congress. This issue was further confused by the proposal from the Stratigraphic Commission of the Geological Society of London to use a single, rather than a dual, classification.

Quaternary Subcommittee

- Ratification by IUGS of GSSP proposal for Middle-Upper Pleistocene Subseries boundary was not successful.

Neogene Subcommittee

- Lack of suitable sections in the Mediterranean for defining the Burdigalian Stage GSSP in an astronomically-tuned, deep-marine section.

Paleogene Subcommittee

- Subcommittee budgets are inadequate to support travel necessary for boundary working groups to make significant progress, nor to support regional committees in under-developed regions (e.g. Africa, Indian subcontinent, SE Asia).

Cretaceous Subcommittee

- Reinvestigation of candidate stratotype sections for several stages to document magnetostratigraphy, stable isotope stratigraphy, etc. and to integrate multiple stratigraphies has demonstrated that candidate sections for some boundaries are unsuitable as GSSPs. This means that new sections must be considered.

Jurassic Subcommittee

- Complete change of subcommittee executive has delayed subcommittee work as new executive becomes familiar with their roles. Lack of travel resources hinders work of subcommittee officers.

Triassic Subcommittee

- IGCP 467 has supported GSSP activities of many subcommittee members. With the end of this project in 2008, many boundary task group members will be without support to continue their activities, possibly delaying progress on GSSPs.

Permian Subcommittee

- No major problems encountered in 2008.

Carboniferous Subcommittee

- Selection of biohorizons and candidate stratotype sections for GSSPs is hindered by endemism in key conodont and foraminiferal lineages.

Devonian Subcommittee

- Lack of travel support from ICS prevents most subcommittee members from attending meetings at which business is carried out.

Silurian Subcommittee

- Low priority given to stratigraphic studies by national grant-awarding agencies make it difficult, if not impossible, to obtain grants to support for research on GSSPs.

Ordovician Subcommittee

- Lack of financial support to print and distribute *The Ordovician Time Table*, a color chart

Cambrian Subcommittee

- Definition of stages in the lower half of the system is hindered by 1) the scarcity of index fossils for high resolution biostratigraphic correlation, and 2) developing consensus on stage names as well as extent and GSSP definition of stages.

Neoproterozoic (Ediacaran and Cryogenian) Subcommittee

- Continuing inadequacy of geochronological control in key sections.
- Conflicting schedules that led to the absence of key Russian participants in the acritarch workshop in Sweden, and poor attendance at the business meeting but not the symposium meeting in Oslo.
- Inconsistent correlation of the ‘Wonoka/Shuram’ negative isotope excursion(s), ‘Gaskiers’ glaciation and microfossil events for the Ediacaran Period.
- Poor state of field-based research and research funding on the Cryogenian and Ediacaran of Australia, which hosts not only the basal Ediacaran GSSP but also potential contenders for the basal Cryogenian GSSP.
- Difficulty in finding excursion leaders and the necessary finance to prepare for a subcommittee visit to Australia.

Precambrian Subcommittee

- Other commitments of subcommittee chair slowed progress on organizing new boundary working groups.

Stratigraphic Classification Subcommittee

- The ICS budget allocation was very small, particularly given the overall importance and significance of the subcommittee.
- The draft paper on Sequence Stratigraphy was subject to heated discussion and ultimately rejected. Accordingly, the task group was disbanded.

Stratigraphic Information Task Group

- The task group consists of a very small core group of dedicated researchers and students who produced almost all of the products. It is essential that more researchers and students become involved and contribute to the products.

9. SUMMARY OF EXPENDITURES IN 2008 (ANTICIPATED THROUGH MARCH 2009):

The ICS Executive Bureau established the following budget for May 2008 – March 2009 after consideration for relative needs, planned activities, and funding requests of the subcommissions; and re-allocating based on the final amount received from IUGS. All Subcommissions were limited to a maximum of \$350 for communications and administration costs. Funds and distributions were maintained by James Ogg (ICS secretary-treasurer) until Septemeber 2008 using a special account in the USA, but each subcommission maintains its own account and budgeting for its allocated funds (as listed below). Itemized financial reports of individual subcommissions are contained within their attached annual reports. Note that these budget reports include projected expenditures through March 2008, which is the month when the next annual (“2009”) funding suite is typically received from IUGS. All amounts are in \$US; although most Subcommission maintain accounting in Euro or other currency.

(A) ICS Operating Budgets and expenditures for 2008:

	<i>Requested by ICS 2008</i>	IUGS 2008 Allocation	<i>Comments on distribution</i>
Quaternary	\$400	\$400	
Neogene	\$2000	\$1500	<i>GSSP-study field trip request moved to Special travel contingency</i>
Paleogene	\$3000	\$2,400	<i>IGC and other travel moved to Special travel contingency.</i>
Cretaceous	\$1000	\$700	<i>Includes deficit acquired due to 2007 short-fall of funding. Six GSSPs will undergo voting and publication. IGC travel (\$3000) moved to Special request.</i>
Jurassic	\$1500	\$1,200	<i>Six GSSPs will undergo voting and publication. IGC and other travel moved to Special travel contingency.</i>
Triassic	\$2000	\$1,600	<i>Six GSSPs will undergo voting and publication. IGC and other travel moved to Special travel contingency</i>
Permian	\$1000	\$800	<i>Major suite of GSSP preparations</i>
Carboniferous	\$500	\$400	
Devonian	\$500	\$400	
Silurian	\$500	\$400	<i>IGC travel (\$1000) moved to Special request needs</i>
Ordovician	\$500	\$400	<i>IGC travel (\$1000) moved to Special request needs</i>
Cambrian	\$3100	\$2,500	<i>Major Working group meeting in Siberia. IGC and other travel moved to Special travel contingency</i>
Ediacaran	\$3000	\$2400	<i>IGC travel (\$1000) moved to Special request needs</i>
Precambrian	\$500	\$400	<i>IGC travel (\$3000) moved to Special request needs</i>
Classification	\$1000	\$500	<i>IGC travel (\$2000) moved to Special request needs</i>
Strat. Info. System	\$2500	\$2000	<i>ICS web development support. Installation of databases to support TimeScale Creator hot-links.</i>
<i>Subcommission Total</i>	\$25,000	\$18,465	
<i>Special travel needs (*)</i>	\$7,500	\$2,500	<i>See explanation above. Pooled requests of 16 subcommissions in their annual reports.</i>
ICS Executive	\$2500	\$3000	<i>ICS Executive meetings; postage/wire fees; IGC awards; coverage of over-draft on previous year</i>
<i>Publications and Contingency</i>	\$3000	\$2400	<i>Drafting, printing/ mailing of special brochures and posters on TimeScale and Earth History for Year of Planet Earth, and other special projects. Partly expended (Purdue printing, etc.)</i>
<i>IGC participation</i>	\$14,000	\$14,100	<i>Subsidy for registration/travel, especially for participation by officers on pensions or from less-affluent nations. \$1000 to partly subsidize ICS buffet (reduced Special travel, Exec, etc. to cover)</i>
TOTAL (\$ USD)	50,000	\$40,000	

Special Budget Categories:

Some aspects of the subcommission requests were aggregated into categories of “*Special travel needs*” and “*Contingency*”. The funds were redistributed by the ICS secretary-treasurer according to the final budget received from IUGS and needs of the subcommissions as their activities occurred during 2007 and early 2008. The ICS *Contingency* supported special and unanticipated needs of subcommission as they arose in the later part of 2007-2008. The *Special Travel Needs* fund pooled the travel requests by the various subcommissions.

10. WORK PLAN, CRITICAL MILESTONES, and ANTICIPATED RESULTS TO BE ACHIEVED FOR April 2009-March 2010:

ICS Executive Committee

- The primary attention of the ICS Chair will be to promote progress on GSSPs by the subcommissions. The ICS budget will be used to encourage and support those boundary working groups that demonstrate the potential to make significant progress. The ICS Chair will collaborate extensively with chairs of the Cambrian, Carboniferous, and Cretaceous subcommissions to stimulate more progress than has hitherto been made. Approval of GSSP proposals for the base Jurassic and base Cretaceous will be given special attention.
- The issues related to definition of the Quaternary and Neogene systems and the Pleistocene and Pliocene series have been voted on by the Quaternary and Neogene subcommissions. In late January, the proposals will be presented to the full commission. Internet based discussions and deliberations will follow, and a vote by ICS will take place by late February 2009.
- The ICS website is outdated. A new webmaster (Fan Junxuan of Nanjing) has been appointed and work has begun to completely redesign the website, which will become the primary outlet for educational products and stratigraphic tools and databases.
- Communication between ICS and important parts of the geoscience community it serves has been poor. A dedicated effort will be made to compile a contact list for all national stratigraphic commissions so that all can be informed of deliberations related to selection of GSSPs and definition and redefinition of international chronostratigraphic units.
- The ICS Chair has directed the Subcommittee on Stratigraphic Classification to address the issue of single versus dual stratigraphic classification and to prepare a paper “Suggestions to editors and authors on best practices in stratigraphic writing.”
- Planning will begin for an ICS workshop to be held in Prague, Czech Republic in May 2010. The focus of the workshop will be “The Success of the GSSP Concept: its history, progress, and value”. All officers of all subcommissions will be expected to attend. Prague is a most appropriate location given that that first GSSP to be approved, that for the Silurian-Devonian boundary, is located nearby in the Barronian Basin.

Quaternary Subcommission

- Working Group on the Lower-Middle Pleistocene Subseries boundary will examine three candidate stratotype sections.
- The GSSP proposal for Middle-Upper Pleistocene Subseries boundary will be revised and resubmitted to ICS for re-approval and, if successful, to IUGS for ratification.
- The Pleistocene-Holocene boundary working group will refocus its activities on subdivision of the Holocene.

- A new working group will be established to consider the definition and status of the term Anthropocene.

Neogene Subcommittee

- Will continue search for suitable sections and/or cores for defining the GSSPs of the Langhian and Burdigalian, the only Neogene stages remaining to be defined.
- Continue to develop and improve upon astronomical tuning of Neogene stages.

Paleogene Subcommittee

- GSSP proposals for Lutetian, Priabonian, and Chattian stages will be completed and voted upon by the boundary working groups and the subcommittee.
- Subcommittee website will be updated.
- International Conference on Climatic and Biotic Events of the Paleogene, Wellington, New Zealand, 12-15 January 2009.

Cretaceous Subcommittee

- 3rd Meeting of Berriasian GSSP and Jurassic-Cretaceous boundary, Milan, Italy, 2-4 March 2008.
7th International Cretaceous Symposium, Plymouth, UK, 6-12 September.
- A draft proposal will be prepared on the Jurassic-Cretaceous boundary and the Berriasian GSSP in late 2009.
- Eight of the Stage GSSP proposals (Valanginian, Hauterivian, Barremian, Aptian, Albian, Coniacian, Santonian, and Campanian) are nearing completion and will be published and voted upon in 2009.

Jurassic Subcommittee

- GSSP proposal for Triassic-Jurassic boundary (base Hettangian Stage) will be voted on by ICS.
- Formal GSSP proposals for Toarcian, Callovian, and Kimmeridgian stages will be completed and put to vote of the subcommittee.
- Vote on Oxfordian GSSP by boundary working group in late 2009.
- Proceedings of 7th International Congress on the Jurassic System, Krakow, Poland, 2006, to be published in *Volumina Jurassica* No. 6 in early 2009.
- Update of subcommittee website.

Triassic Subcommittee

- The base-Olenekian GSSP proposal will be submitted to a Subcommittee vote, and, if approved to ICS and IUGS for approval and ratification in 2009.
- The base-Norian GSSP proposal will be completed by end of 2009.
- The base-Rhaetian GSSP proposal will be completed by end of 2009.
- Meetings of IGCP 572 (Restoration of marine ecosystems following the Permian-Triassic mass extinctions) will be held in USA (Milwaukee, Wisconsin), June-July 2009, and in Turkey, October 2009.
- Publication in 2009 of Special Issue of *Palaeogeography, Palaeoclimatology, Palaeoecology* of proceedings of "The Triassic Climate" workshop, Bolzano/Bozen, 2008.

Permian Subcommittee

- Report on isotopic results of Cisuralian samples from Russia in January 2009.
- Completion of base-Sakmarian GSSP proposal in July 2009.
- Completion of base-Artinskian and base-Kungurian GSSP proposals by December 2009.
- Subcommittee business meeting during International Field Expedition to Argentina, February 2009.

Carboniferous Subcommittee

- ISCS Field Meeting will be held in Moscow Basin and southern Urals, Russia, 11-19 August 2009.
- Devonian-Carboniferous task group will restudy conodont lineage containing biomarkers for boundary.
- Task groups on GSSPs for Serpukhovian, Moscovian, and Kasimovian stages will continue biostratigraphic studies necessary to identify biomarkers for boundaries.
- Task group on GSSP for base Gzhelian stage will evaluate candidate stratotype sections now that biomarker (the conodont *Idiognathodus simulator*) has been approved as the biomarker.

Devonian Subcommittee

- Devonian-Carboniferous boundary conodont workshop in Beijing, summer 2009.
- Publication of volume on Middle Devonian stratigraphy and multi-disciplinary correlation in *Palaeogeography, Palaeoclimatology, Palaeoecology*.
- Publication of proceedings volume of 2007 Nevada Field Meeting in *Palaeontographica Americana*.
- Submission of proposals for formal definition of Givetian and Frasnian substages to ICS
- Update of ISDS website.

Silurian Subcommittee

- Silurian Field Meeting in Sardinia, 4-11 June 2009 with publication of proceedings in an international peer-reviewed journal. Focus will be on integration of biostratigraphic, chemostratigraphic, and sequence stratigraphic scales for the Silurian System.
- Updating of website for Silurian Subcommittee
- ISOS + ISSS workshop “Early Paleozoic Palaeogeography”, Copenhagen, Denmark (see under Ordovician Subcommittee).
- In collaboration with geoscientists at British Geological Survey, restudy of the type areas for the GSSPs for the Silurian, all of which are in the UK except for the base of the Pridoli. All are in serious need of refinement.

Ordovician Subcommittee

- Printing of the Ordovician Time Table
- Production of revised regional correlation charts
- ISOS + ISSS workshop “Early Paleozoic Paleogeography”, Copenhagen, Denmark, September 2009, to result in Geological Society Memoir to be published in 2011 as a IUGS 50th Anniversary contribution and to generate new initiatives for interdisciplinary research on the Early Paleozoic global Earth system, addressing topics that require high-resolution global correlation.

Cambrian Subcommittee

- Vote on candidate GSSPs for base of Stage 5 (and Series 3)
- Vote on GSSP proposal for base of Stage 9
- Identify candidate GSSPs for definition of Stage 10
- XV Field Conference on Cambrian Stage Subdivision will be held in South Kazakhstan, 22 August to 7 September 2009 - an important opportunity for deliberations that can advance resolution of the lower part of the Cambrian System

Neoproterozoic (Ediacaran and Cryogenian) Subcommission

- Formal vote on a consensus working definition for the base of the Cryogenian in 2009, followed by a call for submission of GSSP proposals for the boundary.
- Field excursion to Svalbard, a leading candidate for the GSSP section.
- 2nd meeting on Ediacaran acritarch taxonomy in Australia or Russia in 2009.
- Questionnaire on criteria for subdivision of the Ediacaran System in early 2009.
- Formal vote on consensus subdivision of Ediacaran System in late 2009.

Precambrian Subcommission

- Establishment of working groups to formalize the Hadean Eon and evaluate GSSP sites for the Archean-Proterozoic boundary.
- Further sampling, study, and documentation of potential GSSP for the Archean-Proterozoic boundary in Western Australia.
- Field workshop to visit the Archean-Proterozoic candidate GSSP in Western Australia.

Stratigraphic Classification Subcommission

- New task group for Sequence Stratigraphy will continue progress made at workshop at IGC and will produce first draft of paper.
- Paper on Magnetostratigraphy will be published in *Newsletters in Stratigraphy* in 2009.
- First drafts of papers on Biostratigraphy, Chronostratigraphy, and Lithostratigraphy will be completed and distributed for review.
- Subcommission will consider dual versus single nomenclature of stratigraphic classification.
- Subcommission will prepare paper on “Suggestions to editors and authors on best practices in use of stratigraphic terminology”, which will include not only guidelines but also examples as a means of fostering consistent, correct usage.

Stratigraphic Information Task Group

- Subcommission status was approved for the task group in 1997, but subsequently it produced little. It was recently rejuvenated by Jim Ogg, previous ICS Secretary-General, and should be considered for Subcommission status as its gains contributing members considering its many, important products, and plans to increase its educational role.
- Recruitment and coordination of authors to write *Geologic Time Scale 2010*.
- Produce a comprehensive summary of all GSSPs.
- Redesign the stratigraphic-information part of the ICS website
- Promote *TimeScale Creator*
- Printing and distribution of time scale charts, posters, cards, etc.

11. BUDGET REQUEST TO IUGS FOR 2009 (\$ US)

The following budget request is for operations and special initiatives through March 2010 (funds are generally transferred from IUGS to ICS in April; which implies ICS subcommissions must operate on an April-to-March fiscal year). **SEE ATTACHED EXCEL FILE**

12. REVIEW CHIEF ACCOMPLISHMENTS SINCE 2000

A combined 4-year review was compiled as part of the ICS report for 2004, and the accomplishments for 2007 are listed in Item #7 above. A subset of major accomplishments is reproduced here. More details are in the individual subcommission reports.

A. GSSPs (boundary-stratotypes) created since 2000 (*listed in stratigraphic order*)

Quaternary

1. base of the **Holocene** Series in archived Greenland NorthGRIP (NGRIP) ice core (2008)

Neogene

2. base of the **Zanclean** Stage and of the **Pliocene** Series at Eraclea Minoa, Italy (2000)
3. base of the **Messinian** Stage at Oued Akrech ,Morocco (2000)
4. base of the **Tortonian** Stage at the Monte dei Corvi beach section near Ancona, Italy (2003)
5. base of the **Serravallian** Stage at Ras il Pellegrin section on Malta (2006)

Paleogene

6. base of the **Eocene** Series (and **Ypresian** Stage) in the Dababiya Section near Luxor, Egypt (2003).
7. base of the **Thanetian** Stage at Zumaia, Spain (2008)
8. base of the **Selandian** Stage at Zumaia, Spain (2008)

Cretaceous

9. base of the **Maastrichtian** Stage at Tercis, France (2000)
10. base of the **Turonian** Stage at Pueblo, Colorado, USA (2003)
11. base of the **Cenomanian** Stage and of the **Upper Cretaceous** Series, at Risou, France (2002)

Jurassic

12. base of the **Pliensbachian** Stage at Robin Hood Bay, England (2004)
13. base of the **Aalenian** Stage and of the **Middle Jurassic** Series at Fuentalsaz, Spain (2000)
14. base of the **Sinemurian** Stage at East Somerset, England (2001)
15. base of the **Bathonian** Stage at Ravin du Bès, Bas Auran, near Digne, France (2008)

Triassic

16. base of the **Carnian** Stage at Prati di Sturoes.Sturoes Wiesen, Italy (2008)
17. base of the **Ladinian** Stage at Bagolino, Italy (2005).
18. base of the **Triassic** System at Meishan, China (2001)

Permian

19. base of the *Changhsingian* Stage at Meishan, China (2005)
20. base of the *Wuchiapingian* Stage and of the **Lopingian** Series (Upper Permian) in China (2004)
21. base of the **Guadalupian** Series (Middle Permian) and component *Roadian*, *Wordian* and *Capitanian* Stages in Guadalupian Mountains, USA (2001)

Carboniferous

22. agreement on Series-level divisions (2004)
23. ratification of Series names, and Stage names (2006)
24. base of Visean Stage in Guangxi, China (2008)

Devonian

25. all Devonian stage boundaries are defined by a GSSP
26. publication of two volumes (*Courier Forschungsinstitut Senckenberg*, 220 (205 pp.) and 225 (347 pp.) in 2000, in which the GSSPs of all Devonian stages have been updated and their correlative value for worldwide correlation is demonstrated.

Silurian

27. all Silurian stage boundaries are defined by a GSSP; however, some of these appear to be more useful for regional correlation, rather than having global applicability.

Ordovician

28. base of the *Hirnantian* Stage in China (2005).
29. base of the *Katian* Stage in Oklahoma, USA (2006)
30. base of the *Sandian* Stage and the **Upper Ordovician** Series at Fågelsång in Sweden (2002).
31. base of *Dapingian* Stage and the **Middle Ordovician** Series in China (2006, named 2007)
32. base of the *Floian* Stage at Diabasbrottet in southern Sweden (2002).
33. base of the **Ordovician** System and the **Lower Ordovician** Series and of the *Tremadocian* Stage at Green Point, Newfoundland, Canada (2000).

Cambrian

34. base of the *Paibian* Stage and the **Furongian Series** (uppermost series of Cambrian) in the Paibi section, NW Hunan province, south China (2003).
35. base of *Guzhangian* Stage (Series 3) in China (2007)
36. base of *Drumian* Stage (Series 3) in USA (2007)
37. vote to subdivide the Cambrian into **four series** and **10 stages**.

Proterozoic Era

38. base of the **Ediacaran System** (uppermost system of Proterozoic) in the Flinders Range, Australia (2004).

B. The International Stratigraphic Chart

The International Stratigraphic Chart (divisions of geologic time) highlights all units that are formally defined by a GSSP or anticipated by a future GSSP decision, plus presents the ratified nomenclature of global chronostratigraphy. Two color schemes are available: the International Geological Map of the World conventions or those of the U.S. Geological Survey.

This chart is continually updated, and public graphics can be downloaded in either color scheme at www.stratigraphy.org.

C. The Concise Geologic Time Scale

This major achievement is a condensed and updated version of *Geologic Time Scale 2004* that involved all the subcommissions, compiled the current status of all ratified divisions of geologic time, diagrammed the main biologic, magnetic and geochemical events within each system, and indicated the best-available interpolation of ages for all major events in the Phanerozoic.

13. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2008-2012)

The following is a summary of objectives of the ICS Executive Commission and a selection of key goals noted in the detailed reports of each subcommission. See Section 9 for a summary of objectives for 2007-2008.

ICS Executive Committee

1. Define GSSP sections for all stages of the Phanerozoic Era, and solidify subdivisions of the Precambrian. **All GSSPs were to be ratified by 2008** (IUGS mandate in 2000; but IUGS Ad Hoc review indicated in 2006 that a strict deadline should not be enforced.). The optimistic schedules for ICS/IUGS voting/ratification of the remaining GSSPs in each period is detailed below.
2. Develop a suite of web-accessible international databases on all aspects of chronostratigraphy (paleontology, isotopes, cycles, magnetics, etc.).
3. Produce the ‘*Atlas of the Geologic Time Scale*’ in pocket (A4) book and digital formats.
4. Produce a comprehensive “*Geologic Time Scale 2010*” that will involve the expertise of all subcommissions. The details of Earth’s history will be encapsulated in the *TimeScale Creator* visualization system.
5. Compile summaries of all major sedimentary basins, continental shelves and deep-sea deposits in conjunction with national geologic surveys, ocean drilling program and other groups. These will be incorporated into a GIS-query system that extends the dimensions of the displays of *TimeScale Creator*. This program is under the Executive Task Group for Stratigraphic Information (databases, visualization systems, etc.).

Quaternary Subcommission

1. Consideration of re-definition of Quaternary System and Pleistocene Series.
2. GSSPs for bases of Pleistocene subdivisions.
3. Compiling regional sequences throughout the Quaternary.
4. Classify and formalize, where necessary, divisions based on very short-term events.
5. Detailed correlation charts for specific time periods or specific regions, e.g. Weichselian Late-glacial to Holocene (15 ky); or the last 250 ky in Europe.

Neogene Subcommission

1. Selection of boundary criteria and sections for the definition of the 2 remaining Miocene stage boundaries, namely the base-**Langhian** and base-**Burdigalian**.

Paleogene Subcommittee

1. Complete and publish the GSSPs of the Paleogene.
2. Produce an updated and integrated Paleogene time scale.
3. Produce a state-of-the-art review of the stratigraphic tools used in the Paleogene.
4. Preparation of standardized regional correlation charts and paleogeographic maps by the Regional Committees.

Cretaceous Subcommittee

1. 2009 - Finalize proposals for the base of Valanginian, Hauterivian, Barremian, Aptian, Albian, Coniacian, Santonian, and Campanian stages.
2. 2010 - Finalize proposal for the base of Berriasian (Jurassic/Cretaceous boundary)
3. 2010 to 2012 – Definition of substages.

Jurassic Subcommittee

1. Stage Working Groups to standardise and propose GSSPs for Substages as appropriate, but named ONLY as Lower/Middle/Upper. We do not want to clutter up the nomenclature with named Substages such as Carixian, Domerian etc. These will be approved by the Jurassic Subcommittee, but ICS and IUGS have no current plans for involvement with Substages.
2. Asking the Stage Working Groups to define the bases of the Standard (Ammonite) Zones in terms not only of the correlation marker event but also to propose a stratotype point for the basal boundary in the same way as for the Stages. Similar definition of Regional Zones and maximising the detail of correlation with the Standard Zones would be very valuable.
3. Involvement in the aims and objectives of IGCP Project 506, targetted on developing means of correlation between marine and non-marine Jurassic successions. In recent decades, the latter have been recognised to be very widespread and economically important in several regions, with exciting terrestrial faunas and floras.
4. Developing and expanding the Thematic Working Groups, some of which have been very successful. For this to work they need to be given more specific projects and targets - for example searching for and interpreting data from all sources relevant to reconstructing the palaeobiogeography or the climate of one or more specific time-intervals. In part, this will be given further impetus by involvement in IGCP Project 506.
5. Investigate the establishment of **data-bases** which would bring together and make available information from all sources associated with the "members and friends" of the Jurassic.

Triassic Subcommittee

1. Completion of Triassic GSSPs
 - 2009 – Olenekian, Anisian, and Rhaetian
 - 2010 –Norian.
 - 2011 – Summary volume of all Triassic GSSPs. Emphasis switches to choice of non-marine auxiliary sections; and standardized substages.

Permian Subcommittee

1. Completion of Permian GSSPs
 1. Sakmarian proposal will be completed in 2009.
 3. Artinskian is anticipated in late 2009.
 4. Kungurian is anticipated during 2010.
2. Correlations into continental deposits and across provincial boundaries.
3. Detailed documentation of the geologic evolution of the Earth during the Permian with respect to the established chronostratigraphic framework.

Carboniferous Subcommittee

1. Selecting all GSSPs by 2010.

Devonian Subcommittee

1. Formalize the substage subdivision of stages.

Silurian Subcommittee

1. Restudy of previous GSSPs that are difficult to use for global correlation (e.g., Llandovery/Wenlock).
2. *Integrated Silurian Stratigraphy* -- in which all studies on refinement of biozonal schemes, sequence and cyclo-stratigraphy, stable isotope curve are combined.

Ordovician Subcommittee

1. Publication of an Ordovician time table.
2. Publication of the special volume of “*The global Ordovician Earth system*”.
3. Refocusing of Subcommittee to address the global Ordovician Earth system.

Cambrian Subcommittee

1. The principal objective of the Subcommittee over the next four years is the identification of the best horizons for establishing stage-level and series-level GSSPs within the Cambrian System.
2. All stages of the upper half of the Cambrian will be defined by GSSPs by 2009. Stages of the lower half of the Cambrian are expected to be defined by GSSPs by 2012.
3. A secondary objective of the Subcommittee is to develop and publish regional correlation charts for the Cambrian.

Neoproterozoic (Ediacaran-Cryogenian) Subcommittee

1. End of 2009, vote on full proposals for criteria used to subdivide the Ediacaran System and to define the base of the Cryogenian System.
2. Beginning of 2011, define the base of the Cryogenian System; and subdivide Ediacaran into two or more series.

Precambrian Subcommittee

1. A complete Precambrian time scale in place, with formalized Hadean and Archean eons.
2. Formal GSSP for the base of the Proterozoic.
3. Natural subdivisions of the Archean Eon, with GSSPs for each era-rank subdivision, where possible (Eo-, Paleo-, Meso-, and Neoarchean).
4. Creation and formal definition of an Eoproterozoic Era.
5. Full incorporation of latest insights from planetary science in the earliest part of the terrestrial Precambrian time scale. Compare and contrast the time scales of Earth with those of other planetary bodies, specifically the Moon and Mars.

International Stratigraphic Classification Subcommittee

1. The FINAL GOAL of ISSC is the publication of a new *International Guidebook* for stratigraphic classification printed in 2011. The book is conceived as a user friendly, simple, very well illustrated manual with schemes and color photographs full of real examples from various continents and from various parts of the stratigraphic column. It will consist of

chapters on each major subdiscipline of stratigraphy, which were first published as separate papers in *Newsletters on Stratigraphy*.

Stratigraphic Information Services

1. Comprehensive and authoritative user-friendly time-scale charts (and plotting tools), GSSP databases, and stratigraphic software will make the ICS website a popular “one-stop-shopping” hub for global geoscientists, educators and the public.

ICS DIRECTORY OF OFFICERS 2008-2012

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