



**International Commission on Stratigraphy**  
**Subcommission on Cambrian Stratigraphy**

**ANNUAL REPORT 2014**

**1. TITLE OF CONSTITUENT BODY**

**International Subcommission on Cambrian Stratigraphy**

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**2. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY**

**2.a. Mission Statement**

The Subcommission is the primary body for facilitation of international communication and scientific cooperation on Cambrian stratigraphy.

**2.b. Goals**

The two principal goals of the Subcommission are:

- 1) To develop a global stage-level and series-level chronostratigraphic classification of the Cambrian System.
- 2) To complete and publish regional and global correlation charts for the Cambrian System.

**2.c. Fit within IUGS Science Policy**

The objectives of the Subcommission fall within three main areas of IUGS policy:

- 1) The development of an internationally agreed scale of chronostratigraphic units, fully defined by GSSPs where appropriate (stages and series), and related to a hierarchy of units (zones) to maximize relative time resolution within the Cambrian Period.
- 2) Establishment of frameworks and systems to encourage international collaboration in understanding the evolution of the Earth during the Cambrian Period.
- 3) Working towards an international policy concerning conservation of geologically and paleontologically important sites such as GSSPs.

### **3. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2014**

#### **3.a. List of major publication of Subcommittee work (books, special volumes, key scientific papers)**

##### **1) The 19th International Field Conference on Cambrian Stage Subdivision, Morocco**

The 19th International Field Conference on Cambrian Stage Subdivisions was held in association with a meeting of the Ediacaran Subcommittee (ISES) in September 2014 in Ouarzazate, Morocco. Chief organizers for the conference were J. Javier Álvaro, Sébastien Clausen, and Léa Devaere. An abstract volume and a field guide (*Stratigraphic overview of the Ediacaran and Cambrian from the Anti-Atlas, Morocco*. University of Lille 1, France. 85 pp.) and a special issue (*Geological Evolution of the Ediacaran and Cambrian in the High Atlas and Anti-Atlas Ranges, Morocco*) of *Journal of African Earth Sciences* were published. A theme issue of *Annales de Paléontologie* containing papers resulting from presentations at the meeting is in progress. This issue will be published under the lead editorship of Sébastien Clausen, J. Javier Álvaro and Léa Devaere.

##### **2) Field Workshop on Cambrian Stage Subdivision, China**

A field workshop was held in association with meetings of the Ordovician and Silurian subcommittees in August 2014 in Kunming, China. The meeting was organized under International Geoscience Programme Project 591, with Zhan Renbin as the chief organizer. A volume with extended summaries of talks (*IGCP 591 Field Workshop 2014, Kunming China, 12–21 August 2014, Extended Summary*. Nanjing University Press. 246 pp.) and a field guide were published. A proceedings volume containing papers resulting from presentations at the meeting will be published in *Palaeoworld*.

##### **3) The Cambrian GSSP**

To facilitate global correlation of the Cambrian base and ensure nomenclatural stability to the extent possible, discussion of the merits and perceived weaknesses of the Cambrian GSSP is sought. Possible solutions to the problems surrounding the current GSSP definition are addressed in a paper published in 2014 (Babcock, L.E. et al.: Proposed reassessment of the Cambrian GSSP. *Journal of African Earth Sciences* 98, 3–10) in hopes that the global scientific community will actively participate in developing a well-reasoned and practical solution that will stand the test of time.

##### **4) ISCS Webpage**

The Cambrian Subcommittee's webpage was updated in 2014. The webpage accounts for the many important changes that have occurred with respect to global chronostratigraphy of the Cambrian System, and includes updated contact information, lists of important publications, and other essential information.

#### **3.b. Problems encountered**

The principal difficulties encountered in 2014 were: 1, obtaining funding to support basic research on key stratigraphic intervals (potential GSSP horizons and sections); and 2, obtaining funding to support travel. A modest increase in funding for the coming year would

be of great benefit to members of some of the Working Groups on key horizons who have limited access to funding through nationally competitive research grants.

#### **4. OBJECTIVES AND WORK PLAN FOR NEXT YEAR (2015)**

In 2015 the Cambrian Subcommittee will continue work toward defining GSSPs for provisional stages 2, 3, 4, 5, and 10. In addition, the Subcommittee will examine issues surrounding possible redefinition of the Cambrian GSSP.

##### **Specific GSSP Focus for 2015**

Within the next year, we hope to make a decision on provisional Stage 5 (and Series 3). Earnest work toward definition of a GSSP for the base of provisional Stage 5 has been ongoing for several years, and it is hoped that the work will be finalized within the next year. Secondly, we hope to arrive at a decision on how to define provisional Stage 10 in 2015 or 2016.

#### **5. SUMMARY OF EXPENDITURES IN 2014**

##### INCOME

Carried forward from 2013	\$ 0.00
ICS Allocation	\$ 3666.70
SUBTOTAL 2014 income	\$ 3666.70

##### EXPENDITURE FROM 2014 BUDGET

Contribution to officer's travel expenses (actual travel expenses exceeded the budget slightly)	\$ 3666.70
SUBTOTAL 2014 expenditures	\$ 3666.70

To be carried forward to 2014 \$ 0.00

#### **6. BUDGET REQUESTS AND ICS COMPONENT FOR 2015**

In order to accelerate the pace of work in establishing GSSPs within the Cambrian, we request a modest increase in funds from ICS as compared to previous years. This will be especially important in 2015 because of the need for Voting Members of the Subcommittee to be present at the ISCS field meeting in Newfoundland, where we will have the opportunity to examine and discuss the Cambrian GSSP. The proposed increased funding is also targeted at field research on key sections by Working Group members and young scientists. Also, we request support for Voting Members to attend the Strati2 meeting in Graz, Austria, where the Subcommittee will be sponsoring a symposium on the Cambrian GSSP problem.

INCOME	
Carry-over from 2014	\$ 0.00
PLANNED EXPENDITURES FOR 2015	
Preparation for the 20th Cambrian Stage Subdivision	\$ 1000.00
Working Group Conference in Newfoundland	
Executive and VMs travel costs, Cambrian	
Subcommission field meeting	\$ 3000.00
Support for 2 young scientists to attend the field meeting	\$ 2000.00
General office expenses	\$ 100.00
TOTAL 2015 PLANNED EXPENSES	\$ 6100.00
ICS 2015 BUDGET REQUEST	\$ 6100.00

## APPENDICES

### 7. CHIEF ACCOMPLISHMENTS OVER PAST FIVE YEARS (2010–2014)

- From 2010 to 2014 the Cambrian Stage Subdivision Working Group has made five reconnaissance visits to sections in association with international field conferences. Areas visited are the Czech Republic and Germany (2010), the southern Great Basin, USA (2011), Guizhou, China (2012), Scandinavia (2013), and Morocco and South China (2014).
- In association with each of the field conferences, regional and/or global correlation charts have been published in technical papers.
- The Cambrian Subcommittee has devised a plan for subdividing the Cambrian System into four series and 10 stages. The two lower series will embrace two stages each, and the upper two series will embrace three stages each. Through 2007, two series (Terreneuvian and Furongian) and four stages (Fortunian, Drumian, Guzhangian, and Paibian) had been ratified. Since that time, one stage, the Jiangshanian has been ratified (2011).
- Beginning with the Jiangshanian Stage, the Cambrian Subcommittee has been interested in establishing ASSPs. An ASSP for the Jiangshanian was approved in 2012.

### 8. OBJECTIVES AND WORK PLAN FOR NEXT FOUR YEARS (2015–2018)

- The principal objective of the Subcommittee for 2015 is to narrow possibilities for horizons and GSSP stratotypes for the remaining undefined stages, which are provisionally identified as stages 2, 3, 4, 5, and 10.
- The ISCS has developed a prioritized plan for formalizing definition of the remaining undefined GSSPs. The plan is:
  - 1) Within the next year, provisional Stage 5 is expected to be defined.
  - 2) Provisional Stage 10 is expected to be defined next, but a decision on a GSSP is likely to be at least one or two years away.
  - 3) Following a decision on Stage 10, provisional stages 2, 3, and 4, are expected to be defined in rapid succession. A decision on the preferred GSSP horizon of any one of the three stages will restrict choices for the remaining two stages, so the ISCS is approaching work toward definition of the three stages as closely linked.
  - 4) A more long-term objective is re-examination of the Cambrian System (Terreneuvian Series, Fortunian Stage) GSSP. Imprecision in correlating the lower boundary of the Cambrian System has been encountered on all paleocontinents, and the ISCS is now engaged in seeking a practical solution to remedy the problem (see Babcock, L.E. et al. 2014: Proposed reassessment of the Cambrian GSSP. *Journal of African Earth Sciences* 98, 3–10). A decision on how to proceed with the Cambrian GSSP is expected to be made following ratification of GSSPs for stages 2, 3, and 4.

### 9. ORGANIZATION AND SUBCOMMISSION MEMBERSHIP

**9.a. Names and Addresses of Current Officers and Voting Members**  
**Subcommission officers (2012–2016)**

*Chairman:* Loren E. Babcock (USA, Sweden) [loren.babcock@geol.lu.se](mailto:loren.babcock@geol.lu.se)

*Vice-Chair:* Xingliang Zhang (China) [xzhang69@nwu.edu.cn](mailto:xzhang69@nwu.edu.cn)

*Secretary:* Per Ahlberg (Sweden) [per.ahlberg@geol.lu.se](mailto:per.ahlberg@geol.lu.se)

**List of Voting Members (including officers) for 2012–2016**

- 1) Per Ahlberg, Lund, Sweden [per.ahlberg@geol.lu.se](mailto:per.ahlberg@geol.lu.se)
- 2) José-Javier Álvaro, Villeneuve d'Ascq, Spian [jose-javier.alvaro@uni-lille1.fr](mailto:jose-javier.alvaro@uni-lille1.fr),  
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- 3) Loren E. Babcock, Columbus, USA, and Lund, Sweden [loren.babcock@geol.lu.se](mailto:loren.babcock@geol.lu.se),  
[lbabcock@ccad.edu](mailto:lbabcock@ccad.edu)
- 4) Gabriella Bagnoli, Pisa, Italy [bagnoli@dst.unipi.it](mailto:bagnoli@dst.unipi.it)
- 5) Duck K. Choi, Seoul, Korea [dkchoi@snu.ac.kr](mailto:dkchoi@snu.ac.kr)
- 6) Olaf Elicki, Freiberg, Germany [elicki@geo.tu-freiberg.de](mailto:elicki@geo.tu-freiberg.de)
- 7) Gerd Geyer, Germany [gerd.geyer@mail.uni-wuerzburg.de](mailto:gerd.geyer@mail.uni-wuerzburg.de).
- 8) Rodolfo Gozalo, Valencia, Spain [rodolfo.gozalo@uv.es](mailto:rodolfo.gozalo@uv.es)
- 9) James B. Jago, Mawson Lakes, Australia [jim.jago@unisa.edu.au](mailto:jim.jago@unisa.edu.au)
- 10) Pierre D. Kruse, Darwin, Australia [archaeo.kruse@gmail.com](mailto:archaeo.kruse@gmail.com)
- 11) Linda B. McCollum, Cheney, Washington, USA [lmccollum@ewu.edu](mailto:lmccollum@ewu.edu)
- 12) Malgorzata Moczydlowska-Vidal, Sweden [malgo.vidal@pal.uu.se](mailto:malgo.vidal@pal.uu.se)
- 13) Elena B. Naimark, Moscow, Russia [naimark@paleo.ru](mailto:naimark@paleo.ru)
- 14) Tatyana V. Pegel, Novosibirsk, Russia [pegel@mail.ru](mailto:pegel@mail.ru)
- 15) Shanchi Peng, Nanjing, China [scpeng@nigpas.ac.cn](mailto:scpeng@nigpas.ac.cn)
- 16) Leonid Popov, Wales, UK [leonid.popov@museumwales.ac.uk](mailto:leonid.popov@museumwales.ac.uk)
- 17) Brian R. Pratt, Saskatchewan, Canada [brian.pratt@usask.ca](mailto:brian.pratt@usask.ca)
- 18) Matthew R. Saltzman, Columbus, Ohio, USA [saltzman.11@osu.edu](mailto:saltzman.11@osu.edu)
- 19) Michael Steiner, Berlin Germany [michael.steiner@FU-Berlin.de](mailto:michael.steiner@FU-Berlin.de)
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- 21) Mark Webster, Chicago, Illinois, USA [mwebster@geosci.uchicago.edu](mailto:mwebster@geosci.uchicago.edu)
- 22) Xingliang Zhang, Xi'an, China [xzhang69@nwu.edu.cn](mailto:xzhang69@nwu.edu.cn)
- 23) Maoyan Zhu, Nanjing, China [myzhu@nigpas.ac.cn](mailto:myzhu@nigpas.ac.cn)
- 24) Anna Zylinska, Warsaw, Poland [anna.zylinska@uw.edu.pl](mailto:anna.zylinska@uw.edu.pl)

**9.b. List of Working (Task) Groups and their officers**

1. WG on Stage 10 GSSP, chaired by Per Ahlberg (Sweden)
2. WG on Stage 5 GSSP, chaired by Linda B. McCollum (USA)
3. WG on Stage 4 GSSP, chaired by James B. Jago (Australia)
4. WG on Stage 3 GSSP, chaired by Xingliang Zhang (China)
5. WG on Stage 2 GSSP, chaired by Michael Steiner (Germany)

### **9.c. Interfaces with other international projects**

In 2014, the Cambrian Subcommittee held its annual meeting and field conference jointly with the Edicaran Subcommittee in Ouarzazate, Morocco. Chief organizers for the conference were J. Javier Álvaro, Sébastien Clausen and Léa Devaere. Also, a field workshop was held in association with meetings of the Ordovician and Silurian subcommittees in August 2014 in Kunming, China. The meeting was organized under International Geoscience Programme Project 591, with Zhan Renbin as the chief organizer.

In 2015, the Cambrian Subcommittee will hold its annual field meeting in Newfoundland sometime during the summer. Ed Landing, Karem Azmy, Paul M. Myrow, and Guy Narbonne are coordinating the meeting.