



# International Commission on Stratigraphy Subcommission on Quaternary Stratigraphy

## ANNUAL REPORT 2015

### 1. TITLE OF CONSTITUENT BODY

Subcommission on Quaternary Stratigraphy (SQS)

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

1. Chronostratigraphic subdivision of the Quaternary System/Period facilitated by the intercalibration of biostratigraphies, construction of integrated zonations, and recognition of global datum points, allowing correlation worldwide and between terrestrial and marine sequences.
2. Definition of Series/Subseries/Stage and, where appropriate Substage, boundaries through the selection of recommended GSSPs.
3. Promoting SQS's activities within the wider Quaternary geoscience community through publications, symposia, and the SQS website, and creating opportunities to study and compare stratigraphic sections by means of field meetings.
4. The objectives satisfy the IUGS mandate 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 Quaternary geology world-wide; attracting competent students and research workers to the discipline; and fostering an increased awareness among individual scientists world-wide of those related programs being undertaken.

### 3a. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2015

1. 19th INQUA Congress, Nagoya, Japan, July 27 – August 2, 2015. Four notable activities.
  - a. “The Early–Middle Pleistocene transition: local records, global correlations”, a full-day symposium convened by Head, M.J., Gibbard, P.L., Kumai, H., and Pillans, B., focusing on the Lower–Middle Pleistocene Subseries boundary. This symposium showcased the latest research on the three competing candidate GSSPs: the Chiba section (Japan, see field excursion below) and the Montalbano Jonico and Valle di Manche sections (Italy), and featured presentations by the main proponents of each section. Sponsored by SQS and INQUA, including ICS-NSF funding that allowed Profs. Maria Marino (Montalbano Jonico) and Luca Capraro (Valle di Manche) to attend both this symposium and the Chiba field excursion, below.

- b. Business meeting of the SQS in which attendees were appraised of developments, and invited to comment on future proposed activities and priorities.
  - c. Invited plenary address by M. J. Head, the Chair of SQS, entitled: “The Quaternary System and its official subdivision: past, present, and future.”
  - d. Post-Congress field excursion to the Lower–Middle Pleistocene Chiba section, Japan, August 3–4, 2015. This two-day field excursion was arranged in conjunction with the INQUA symposium described above, allowing Profs. Maria Marino and Luca Capraro, as principal proponents of the two competing candidate GSSPs, to examine the section (with funding support from ICS-NSF) along with many other members of the Lower–Middle Pleistocene Boundary Working Group. This field trip featured on Japanese TV and national newspaper media, with the Chair of SQS (M.J. Head) being interviewed on both.
2. An SQS / INTIMATE Working Group has submitted to the SQS Executive a proposal for the subdivision of the Holocene into Lower, Middle, and Upper Holocene subseries and their corresponding stages. This proposal is currently under discussion by SQS and voting is expected to commence in a few weeks. This proposal follows a discussion paper in 2012 (Walker et al., 2012, *Journal of Quaternary Science*, 27, 649–659) in which the basic elements of this proposal were published.
  3. The Anthropocene Working Group presented evidence for epoch status of the Anthropocene at the STRATI 2015 Congress at Graz on 20<sup>th</sup> July 2015; and at the 19th INQUA Congress, Nagoya, Japan, July 27 – August 2, 2015. Analysis of the overall stratigraphic character of the Anthropocene is proceeding well, and considerable, if not unanimous, agreement has been reached within the Working Group on its stratigraphic reality as both a geochronological and chronostratigraphic unit. The Working Group is currently examining the two options for defining the boundary, i.e. via GSSA or GSSP, and considering possible GSSPs.

### 3B LIST OF MAJOR PUBLICATIONS OF SUBCOMMISSION WORK (BOOKS, SPECIAL VOLUMES, KEY SCIENTIFIC PAPERS)

Head, M.J., Gibbard, P.L. and van Kolfschoten, T. (eds.), 2015. The Quaternary System and its formal subdivision. *Quaternary International*, 383: 1–208. This is the outcome of an SQS-sponsored full-day symposium on the formal subdivision of the Quaternary held at the STRATI 2013 Congress in Lisbon. It includes many articles by members of SQS and its constituent working groups.

Head, M.J., and Gibbard, P.L., 2015. Formal subdivision of the Quaternary System/Period: Past, present, and future. *Quaternary International*, 383: 4–35.

Waters, C.N., Syvitski, J.P.M., Gałuszka, A., Hancock, G.J., Zalasiewicz, J., Cearreta, A., Grinevald, J., McNeill, J.R., Summerhayes, C. and Barnosky, A. 2015. Can nuclear weapons

fallout mark the beginning of the Anthropocene Epoch? *Bulletin of the Atomic Scientists*, 71(3), 46-57.

Waters, C.N., Zalasiewicz, J. et al., in press. The Anthropocene is functionally and stratigraphically distinct from the Holocene. *Science*.

### 3C. PROBLEMS ENCOUNTERED, IF APPROPRIATE

The Working Group on the Upper Pleistocene Subseries Boundary, after five years of inactivity, began making progress last year with the suggestion of a new candidate GSSP, the Fronte section, in Taranto, Italy, with Dr Alessandra Negri, a key proponent of this section, joining the Working Group. Excellent science is being conducted on the Fronte section, but finding a ~130 ka record in marine deposits on land that does not display facies changes at or near the boundary presents special challenges. An additional candidate GSSP is therefore sought, and a recently suggested possibility is in an Antarctic ice core (Head and Gibbard, 2015). Such a potential GSSP is currently being explored.

It was hoped that by the end of 2015, proposals for the three candidate GSSPs for the Middle Pleistocene Subseries Boundary would be submitted. The INQUA Congress this summer revealed, however, that while important progress is being made on all three sections (Chiba section in Japan, and the Montalbano Jonico and Valle di Manche sections in Italy), more time is needed to complete this work. Proposal submission has therefore been delayed by one year, with proposals tentatively due for submission by the end of 2016.

#### 4a. OBJECTIVES AND WORK PLAN FOR NEXT YEAR (2016)

1. Encourage the proponents of the three Middle Pleistocene candidate GSSPs to submit their proposals, hopefully before the end of 2016.
2. Develop a case for using an Antarctic ice core as a GSSP for the Late Pleistocene. The cores are already analyzed, but theoretical aspects including global correlation and interhemispheric phasing will need to be considered.
3. An SQS-sponsored special symposium “The Quaternary System: precision and reliability in global correlation” to be convened by M. J. Head has been submitted to the 35<sup>th</sup> International Geological Congress, Cape Town, in 2016. This should provide a forum for the latest research on the three Middle Pleistocene candidate GSSPs, and progress by working groups on the Late Pleistocene and Anthropocene.
4. Submit the Holocene subdivision proposal to ICS, assuming it receives approval from SQS.

#### 5. SUMMARY OF EXPENDITURES IN 2015 (Can \$)

	Payment	Deposit	Balance
Carried forward (November 7, 2014)			1868.73*

John Wiley & Sons sponsorship for 2014		443.00	2311.73
M.J. Head (STRATI 2015 registr. & hotel*)	1071.52		1240.21
Balance at November 26, 2015			<u>1240.21</u>

\* = corrected from CAN\$1845.97 due to discrepancies in exchange rate.

ICS–NSF Special Funding (2015) – for reimbursement as follows:

Dr. Redzhep (Roger) Kurbanov (attendance at STRATI 2015, Graz) allowance of US\$800.00

Prof. Luca Capraro (attendance at INQUA\*) allowance up to US\$2000.00

Prof. Maria Marino (attendance at INQUA\*) allowance up to US\$2000.00

Prof. Martin Head (one-way travel to Graz for STRATI 2015) US\$1114.44

\*= INQUA full-day symposium “The Early–Middle Pleistocene transition: local records, global correlations” and two-day post-Congress field excursion to the Middle Pleistocene GSSP candidate Chiba section, Japan, August 3–4, 2015.

## 6. BUDGET REQUESTS AND ICS COMPONENT FOR 2015

Funds are requested to enable the Chair of SQS, Martin J. Head, to attend the 35<sup>th</sup> International Geological Congress, Cape Town, in 2016. He is convening an SQS-sponsored special symposium “The Quaternary System: precision and reliability in global correlation” at the IGC which will be invaluable for the development of future Quaternary GSSP proposals, particularly those for the Middle and Late Pleistocene. The Toronto–Cape Town return airfare alone exceeds US\$4500, with Congress registration and accommodation adding to the cost. A total of US\$5000 is therefore requested.

## 7. CHIEF ACCOMPLISHMENTS OVER PAST FIVE YEARS (2011–2015)

1. Calabrian Stage/Age ratified in December 2011. Reference: Cita, M.B., Gibbard, P.L., Head, M.J., and The Subcommittee on Quaternary Stratigraphy, 2012. Formal ratification of the base Calabrian Stage GSSP (Pleistocene Series, Quaternary System). Episodes 35(3): 388–397.
2. Submission to SQS of proposal to subdivide the Holocene into three subseries and their corresponding stages, in October 2015.
3. Strong progress on all three candidate GSSPs for the Middle Pleistocene; some progress on the Late Pleistocene GSSP; strong activity by the Anthropocene Working Group.

8. OBJECTIVES AND WORK PLAN FOR NEXT 4 YEARS (2016–2019) – ranked according to priority.

1. Nominate two GSSPs to subdivide the Holocene Series into three named stages.
2. Nominate GSSP for the Middle Pleistocene Subseries/Stage boundary.

3. Explore further chronostratigraphic subdivision of the Quaternary System/Period, including the duration and status of the “Anthropocene”.
4. Nominate GSSP for the Upper Pleistocene Subseries/Stage boundary.

## 9. ORGANIZATION AND SUBCOMMISSION MEMBERSHIP

### 9a Names and Addresses of Current Officers and Voting Members

#### *Officers of SQS*

Chair: Professor Martin J. Head  
 Department of Earth Sciences  
 Brock University  
 1812 Sir Isaac Brock Way  
 St. Catharines  
 Ontario L2S 3A1, Canada  
 Phone: 905-688-5550 ext. 5216  
 Email: mjhead@brocku.ca

Vice-Chair: Professor Brad Pillans  
 Research School of Earth Sciences  
 The Australian National University  
 Canberra, Act, 0200,

Australia  
 Phone: +61-2-6125 9644 (Office)  
 +61-2-6249 1507 (Lab)  
 Fax: +61-2-6125 3683  
 Email: brad.pillans@anu.edu.au

Secretary: Professor Jan A. Zalasiewicz  
 Department of Geology  
 University of Leicester  
 Leicester UK, LE1 7RH, UK  
 Phone: +44 (0)116 252 3928  
 Fax: +44 (0)116 252 3918  
 Email: jaz1@leicester.ac.uk

#### *Voting Members of SQS*

Prof. Brent Alloway  
 School of Geography, Environment & Earth Sciences  
 Victoria University of Wellington  
 Wellington 6012  
 New Zealand  
 Phone: 04 463 5844  
 Mobile: +64-21-215-5968  
 Fax: +64 4 463 5186  
 E-mail: brent.alloway@vuw.ac.nz

Dr Alan Glenn Beu  
 Paleontology Department  
 Institute of Geological & Nuclear Sciences  
 P O Box 30368, Lower Hutt, New Zealand 5040  
 [Courier address: 1 Fairway Drive, Avalon,  
 Lower Hutt, New Zealand 5010]  
 Direct phone: +64-4-570 4847  
 Fax: +64-4-570 4600  
 Email: a.beu@gns.cri.nz

Dr. Kim Cohen  
 Department of Physical Geography  
 Faculty of Geosciences  
 Utrecht University  
 P.O.BOX 80.115  
 3508 TC Utrecht  
 The Netherlands

Phone: +31 30 253 5774  
 Email: K.M.Cohen@uu.nl

Professor Philip L. Gibbard  
 Cambridge Quaternary  
 Department of Geography, University of Cambridge  
 Downing Street, Cambridge CB2 3EN, England  
 Phone: +44 (0)1223 333924  
 Fax: +44 (0)1223 333392  
 Email: plg1@cam.ac.uk

Professor Karen Luise Knudsen  
 Department of Earth Sciences  
 University of Aarhus  
 C.F. Mollers Alle 120  
 DK-8000 Aarhus C  
 Denmark  
 Phone: +45 8942 3557  
 Fax: +45 8618 3936  
 Email: karenluise.knudsen@geo.au.dk

Professor Leszek Marks  
 Polish Geological Institute  
 Rakowiecka 4, PL 00-975 Warsaw, Poland  
 Phone: +4822 849 5096  
 Fax: +4822 849 4921  
 Email: lmar@pgi.waw.pl / lmarks@geo.uw.edu.pl

Dr. Fabrizio Lirer  
Istituto Ambiente Marino Costiero (IAMC)-CNR  
Calata Porta di Massa, interno Porto di Napoli  
80133, Napoli, Italy  
Phone: +39 81 5423851  
Fax: +39 81 5423888  
Email: fabrizio.lirer@iamc.cnr.it

Professor Thomas Litt  
Institute of Paleontology  
University of Bonn  
Nussallee 8  
D-53115 Bonn, Germany  
Phone: +49 228 732736  
Fax: +49 228 733509  
Email: t.litt@uni-bonn.de

Professor Liu Jiaqi  
Institute of Geology and Geophysics  
Chinese Academy of Sciences  
Beituchenglu, Qijiahuozhi  
P.O. Box 9825, Beijing  
100029 China  
Tel. +86 10 62008005(office) / 62008240(home)  
Fax. +86 10 62052184/62010846  
Email: liujq@mail.igcas.ac.cn  
and: liujiaqi2001@yahoo.com.cn

Professor Jerry McManus  
Lamont-Doherty Earth Observatory  
Columbia University  
239 Comer 61 Route 9W – PO Box 1000  
Palisades, New York  
10964-8000, USA  
Phone: +1 (845) 365-8722  
Fax: +1 508 289 2175  
Email: jfm2163@columbia.edu

Professor Jan A. Piotrowski  
Department of Earth Sciences  
University of Aarhus  
C.F. Moellers Alle 1120  
DK-8000 Aarhus C  
Denmark  
Phone: +45 8942 2555 / +45 8942 9402  
Fax: +45 8613 9248  
Skype: jan.a.piotrowski

Professor Matti Räsänen  
Department of Geology  
University of Turku  
FIN-20014 Turun Yliopisto  
Finland  
Phone: +358-(0)2-333 5494  
Fax: +358-(0)2-333 6580

Email: matti.rasanen@utu.fi

Prof. Sune Olander Rasmussen  
Centre Coordinator  
Centre for Ice and Climate  
Niels Bohr Institute  
University of Copenhagen  
Juliane Maries Vej 30  
2100 Copenhagen, Denmark  
Phone: +45 353-20590  
Email: olander@gfy.ku.dk

Dr. Jean-Pierre Suc  
Institut des Sciences de la Terre Paris (ISTEP),  
UMR 7193, Laboratoire Evolution et Modélisation  
des Bassins Sédimentaires, Université Pierre &  
Marie Curie, Paris 6, 75005 Paris, France.  
Postal address: 385 route du Mas Rillier,  
69140 Rillieux la Pape, France.  
Phone: +33(0)6.80.46.72.53  
or +33 (0)9 50 85 69 57  
Email: jeanpierre.suc@gmail.com /  
and: jean-pierre.suc@upmc.fr.

Dr. Alexey S. Tesakov  
Geological Institute  
Russian Academy of Sciences  
Pyzhevsky, 7  
119017 Moscow  
Russia  
Phone: +7 495 230-8085  
Email: tesak@ginras.ru

Dr. Charles Turner,  
Department of Earth Sciences,  
The Open University,  
Milton Keynes MK7 6AA,  
UK  
Phone: +44 1908 652889  
Fax: +44 1908 655151  
E-mail chassturner@aol.com

Professor Thijs van Kolfschoten  
Faculty of Archaeology, Leiden University  
Reuvenplaats 4, 2300 RA Leiden,  
The Netherlands  
Phone: + 31 (0)71 527 2640 / 2925 / 2390  
Fax: + 31 (0)71 527 2928  
Email: T.van.Kolfschoten@rulpre.leidenuniv.nl

Professor M.J.C. Walker  
Department of Archaeology and Anthropology  
University of Wales, Lampeter  
Ceredigion, SA48 7ED,  
Wales, UK  
Email: walker@lamp.ac.uk

Phone: +44 1570 424736  
Fax: +44 1570 423669

Professor Cari Zazo  
Departamento de Geología

Museo Nacional de Ciencias Naturales (CSIC)  
Jose Gutierrez Abascal 28006-Madrid, Spain  
Phone: ++34.91.4111328 (ext.11899)  
Fax: ++.34.91.5644740  
Email: mcncz65@mncn.csic.es

## 9B LIST OF WORKING (TASK) GROUPS AND THEIR OFFICERS

### *Working Group on the “Anthropocene”*

Convener: Professor Jan A. Zalasiewicz  
Department of Geology  
University of Leicester  
Leicester UK, LE1 7RH, UK  
Phone: +44 (0)116 252 3928  
Fax: +44 (0)116 252 3918  
Email: jaz1@leicester.ac.uk

Secretary: Dr. Colin Waters  
British Geological Survey  
Keyworth, Nottingham NG12 5GG, U.K.  
Phone: +44 (0)115 9363144  
Email: cnw@bgs.ac.uk

Full membership of the Working Group: Tony Barnosky (USA), Alejandro Cearreta (Spain), Paul Crutzen (Germany), Matt Edgeworth (UK), Erle Ellis (USA), Mike Ellis (UK), Ian Fairchild (UK), Agnieszka Gałuszka (Poland), Philip Gibbard (UK), Jacques Grinevald (Switzerland), Peter Haff (USA), Irka Hajdas (Switzerland), Alan Haywood (UK), Juliana Assunção Ivar do Sul (Brazil)\*, Catherine Jeandel (France), Reinhold Leinfelder (Berlin), John McNeill (USA), Cath Neal (UK), Eric Odada (Kenya), Naomi Oreskes (USA), Clement Poirier (France), Simon Price (UK), Andrew Revkin (USA), Dan Richter (USA), Mary Scholes (South Africa), Victoria C. Smith (Oxford), Will Steffen (Australia), Colin Summerhayes (UK), James Syvitski (USA), Davor Vidas (Norway), Michael Wagreich (Austria), Colin Waters (Secretary, UK), Mark Williams (UK), Scott Wing (USA), Alex Wolfe (Canada), Jan Zalasiewicz (Chair, UK), An Zhisheng (Xi’an) (China). \* = new member in 2015. Bruce Smith (USA) dropped from the membership in 2015.

### *Working Group on the subdivision of the Holocene Series*

Convener: Professor M.J.C. Walker  
Department of Archaeology and Anthropology  
University of Wales, Lampeter  
Ceredigion, SA48 7ED,  
Wales, UK  
Email: walker@lamp.ac.uk  
Phone: +44 1570 424736  
Fax: +44 1570 423669

Full membership of the Working Group: M. Berkelhammer (USA), S. Björck (Sweden), L.C. Cwynar (Canada), D.A. Fisher (Canada), A.J. Long (UK), J.J. Lowe (UK), R.M. Newnham (New Zealand), S.O. Rasmussen (Denmark), M.J.C. Walker (Convener, UK), and H. Weiss (USA). No change in membership from 2014.

### *Working Group on the Middle/Upper Pleistocene Subseries Boundary*

Co-convener: Professor Thomas Litt  
Institute of Paleontology  
University of Bonn  
Nussallee 8  
D-53115 Bonn, Germany  
Phone: +49 228 732736  
Fax: +49 228 733509

Email: t.litt@uni-bonn.de  
Co-convener: TBA

Full membership of the Working Group: Art Bettis (USA), Aleid Bosch (Netherlands), Philip Gibbard (UK), Liu Jiaqi (China), Peter Kershaw (Australia), Wighart von Koenigswald (Germany), Thomas Litt (Co-convener, Germany), Jerry McManus (USA), Alessandra Negri (Italy), Charles Turner (UK), Martin J. Head (Canada), and Jan A. Zalasiewicz (Co-convener, UK). No change in membership from 2014, although Jan A. Zalasiewicz stepped down as co-convener in 2015.

### *Working Group on the Lower/Middle Pleistocene Subseries Boundary*

Co-convener: Professor Martin J. Head  
Department of Earth Sciences  
Brock University  
1812 Sir Isaac Brock Way  
St. Catharines  
Ontario L2S 3A1, Canada  
Phone: 905-688-5550 ext. 5216  
Email: mjhead@brocku.ca

Co-convener: Professor Brad Pillans  
Research School of Earth Sciences  
The Australian National University  
Canberra, Act, 0200  
Australia  
Phone: +61-2-6125 9644 (Office)  
+61-2-6249 1507 (Lab)  
Fax: +61-2-6125 3683  
Email: brad.pillans@anu.edu.au

Full membership of the Working Group: Luca Capraro (Italy), Maria Marino (Italy)\*, Craig Feibel (USA), Martin J. Head (Co-convener, Canada), Hisao Kumai (Japan), Luc Lourens (Netherlands), Jiaqi Lui (China), Anastasia Markova (Russia), Tom Meijer (Netherlands), Brad Pillans (Co-convener, Australia), Yoshiki Saito (Japan), Charles Turner (UK), Cesare Ravazzi (Italy), Thijs Van Kolfshoten (Netherlands). \* = new member in 2015. Neri Ciaranfi (Italy) sadly retired from this Working Group for health reasons.

## 9C INTERFACES WITH OTHER INTERNATIONAL PROJECTS

The Subcommittee on Quaternary Stratigraphy (SQS) maintains close ties with The International Union for Quaternary Science (INQUA) through its Commission on Stratigraphy and Chronology (SACCOM). SACCOM supports research on candidate GSSPs through its grants program, so directly assists the work of SQS.

Of equal importance, INQUA established, during its congress this summer, a permanent committee with the express task of liaising with SQS. This will allow the INQUA Executive to respond rapidly to any issues of stratigraphy raised by SQS and vice versa. Prof. Thijs van Kolfshoten, a Vice-President of INQUA, chairs this committee, and also serves as a voting member of SQS.

Respectfully submitted:  
Martin J. Head, Chair SQS  
St. Catharines, 26th November, 2015