



International Commission on Stratigraphy Subcommission on Quaternary Stratigraphy

ANNUAL REPORT 2021

1. TITLE OF CONSTITUENT BODY and NAME OF REPORTER

Subcommission on Quaternary Stratigraphy (SQS)
Reporting Officer: Jan Zalasiewicz, Chair 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.

3. ORGANISATION - interface with other international projects / groups

SQS works closely with the International Union for Quaternary Research (INQUA), which represents and serves the interests of Quaternarists worldwide. INQUA provides advice and crucial feedback on the stratigraphic needs of the wider Quaternary community. Prof. Thijs van Kolfschoten is both a voting member of SQS and President of INQUA, allowing direct and rapid liaison with the SQS on stratigraphic issues. An account of SQS progress and plans has recently been published in the INQUA Newsletter, to help the exchange of information.

3a. Nominated Officers for 2020-2024 period:

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Vice-Chair (website): Professor Martin J. Head

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

INQUA provides feedback and advice on SQS activities. INQUA's Stratigraphy and Chronology Commission (SACCOM) potentially offers modest financial support through its grants program, thereby assisting the work of SQS. Funding to assist with a field workshop intended to inaugurate new research on the Gelasian GSSP has been obtained from INQUA. The award to the Anthropocene Working Group of €800 000 from the Haus Kulturen der Welt, Berlin continues to facilitate the administration and analysis of potential candidate GSSPs. Analyses of candidate sites has made excellent progress (see below), despite the inevitable delays caused by the Covid-19 pandemic.

5. CHIEF ACCOMPLISHMENTS AND PRODUCTS

Holding of the successful INQUA-SQS GELSTRAT International Symposium, Palazzo Steri, Palermo, Sept 1-2 2021, on Neogene–Quaternary boundary and Gelasian GSSP, followed by a field workshop (originally planned for June, 2020 but postponed due to the COVID pandemic). The workshop inaugurated a multidisciplinary multi-year research program to more precisely constrain the Gelasian (and Pleistocene/Quaternary) GSSP, using material obtained from the Gelasian stratotype in fieldwork following the Symposium. There was strong media interest: https://www.rainews.it/tgr/sicilia/video/2021/09/sic-Gela-geologia-cambiamenti-climatici-Palermo-07d2d9d7-27bc-41fe-b2c5-0c2ce2d13c41.html?fbclid=IwAR07JXH-ctRbZYLQIQz_SpAvWtfK71si1QgbSs7QHohmLBfjSquR0cjJ8Fs
<https://www.rainews.it/tgr/sicilia/video/2021/09/sic-geologi-ricerca-butera-gela-clima-2c0784dc-c5ca-48f7-ba87-61b2286357a0.html>

Holding of the 'Anthropogenic Markers' meeting, Haus der Kulturen der Welt, Berlin, September 22-24, for presentation of the (highly promising) initial analytical results of stratigraphic proxy data for the 12 Anthropocene GSSP candidate stratotypes.

SQS publications and conference abstracts:

Zalasiewicz, J., Bertini, A., Zhou, L. and Head, M. 2020. The Quaternary in the Geological Time Scale: An update. *Quaternary Perspectives* **29**, 6-9.

- Suganuma, Y., Okada, M., Head, M.J., Kameo, K., Haneda, Y., Hayashi, H., Irizuki, T., Itaki, T., Izumi, K., Kubota, Y., Nakazato, H., Nishida, N., Okuda, M., Satoguchi, Y., Simon, Q., Takeshita, Y., 2021. Formal ratification of the Global Boundary Stratotype Section and Point (GSSP) for the Chibanian Stage and Middle Pleistocene Subseries of the Quaternary System: the Chiba Section, Japan. *Episodes* 44(3), 317-347.
- Head, M.J., Pillans, B., Zalasiewicz, J.A. and the ICS Subcommittee on Quaternary Stratigraphy. 2021. Formal ratification of subseries for the Pleistocene Series of the Quaternary System. *Episodes* 44(3), 241-247.
- Head, M.J. 2021. Review of the Early-Middle Pleistocene boundary and Marine Isotope Stage 19. *Progress in Earth and Planetary Science* 8, Article 50.
- Zalasiewicz, J. Waters, C.N., Ellis, E.C., Head, M.J., Vidas, D., Steffen, W., Thomas, J.A., Horn, E., Summerhayes, C.P., Leinfelder, R., McNeill, J.R., Gałuska, A., Williams, M., Barnosky, A.D., Richter, D. DeB., Gibbard, P.L., Syvitski, J., Jeandel, C., Cearreta, A., Cundy, A.B., Fairchild, I.J., Rose, N.L., Ivar do Sul, J.A., Shoty, W., Turner, S., Wapre, M. & Zinke, J. 2021. The Anthropocene: comparing its meaning in geology (chronostratigraphy) with conceptual approaches arising in other disciplines. *Earth's Future* 10.1029/2020EF001896.
- Gibbard PL, Bauer AM, Edgeworth M, Ruddiman WF, Gill JL, Merritts DJ, Finney SC, Edwards LE, Walker MJC, Maslin M, Ellis EC. 2021 online. A practical solution: the Anthropocene is a geological event, not a formal epoch. *Episodes*. <https://doi.org/10.18814/epiugs/2021/021029>
- Head, M.J., Steffen, W., Fagerlind, D., Waters, C.N., Poirier, P., Syvitski, J., Zalasiewicz, J.A., Barnosky, A.D., Cearreta, A., Jeandel, C., Leinfelder, R., McNeill, J.R., Rose, N.L., Summerhayes, C., Wapre, M. & Zinke, J. 2021 online. The Great Acceleration is real and provides a quantitative basis for the proposed Anthropocene Series/Epoch. *Episodes*. <https://doi.org/10.18814/epiugs/2021/021031>
- Head, M. J., Gibbard, P. L., and Zalasiewicz, J.: Subdivision of the Quaternary System: formal subseries and new corresponding stages for the Pleistocene and Holocene, EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-6919, <https://doi.org/10.5194/egusphere-egu21-6919>, 2021.
- Head, M. J., Zalasiewicz, J., Bertini, A., and Zhou, L.: The Mid-Brunhes Event: a second stage for the Middle Pleistocene Subseries?, EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-6900, <https://doi.org/10.5194/egusphere-egu21-6900>, 2021.
- Waters, C. N., Zalasiewicz, J., and Williams, M.: Progress in assessment of the Anthropocene Series in the Geological Time Scale (GTS), EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-9491, <https://doi.org/10.5194/egusphere-egu21-9491>, 2021.
- Turner, S. and the AWG-HKW-MPIWG Anthropocene GSSP: Progress in the formalisation of the Anthropocene GSSP, EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-3226, <https://doi.org/10.5194/egusphere-egu21-3226>, 2021.
- Stegner, M. A., La Selle, S., Sherrod, B., Barnosky, A., and Hadly, E.: Dynamics of biotic and abiotic markers of the Anthropocene at Jasper Ridge Biological Preserve, California, USA, EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-6685, <https://doi.org/10.5194/egusphere-egu21-6685>, 2021.
- Himson, S., Williams, M., McGann, M., Rose, N., Wilkinson, I., Zalasiewicz, J., and Waters, C.: A biostratigraphic record of Anthropocene ecological change in one of the world's most invaded aquatic ecosystems, San Francisco, CA., EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-15133, <https://doi.org/10.5194/egusphere-egu21-15133>, 2021.
- Oleksandrenko, A., Appleby, P., Noernberg, T., and Shoty, W.: Americium-241 in peat bogs as a marker of the beginning of the Anthropocene: examples from Europe and North America., EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-3744, <https://doi.org/10.5194/egusphere-egu21-3744>, 2021.
- Meszar, M., Hain, K., Wapre, M., Lappé, K., Mosser, M., Hornek, K., Koukal, V., Litschauer, C., and Piperakis, N.: Tracing the Anthropocene bomb-spike in urban strata of Vienna, EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-11930, <https://doi.org/10.5194/egusphere-egu21-11930>, 2021.
- Waters, C.N., Head, M.J., Turner, S.J. & Zalasiewicz, J.A. 2021. Progress on the appraisal and definition of the proposed Anthropocene Epoch/Series GAC-MAC 2021 Abstract.

6. SUMMARY OF EXPENDITURE IN 2021

Travel/subsistence for Martin Head for the September 2021 GELSTRAT meeting: Can \$3035.20

7. SUMMARY OF INCOME IN 2021

Euro 800,000 over 2 years (2019, 2020) awarded to Anthropocene Working Group by the Haus Kulturen der Welt, Berlin, continues to support ongoing analysis of candidate stratotypes.

8. BUDGET REQUESTED FROM ICS IN 2021

USD 2000 for continued GELSTRAT sampling (request separately sent by MJH).

9. WORK PLAN, CRITICAL MILESTONES, ANTICIPATED RESULTS AND COMMUNICATIONS TO BE ACHIEVED NEXT YEAR:

- Given the rapid progress being made in the analysis of candidate stratotypes for the Anthropocene, this is likely to be the next major decision for the SQS, following selection of a candidate stratotype and subsequent voting by the Anthropocene Working Group.
- The priority for SQS is the selection of a GSSP for the Upper Pleistocene Subseries and its corresponding stage. Two potential candidates have already been identified (Fronte Section, Taranto, Italy; and an ice core in Antarctica). The aim is to have proposals developed for these potential candidates as soon as possible. The Upper Pleistocene Working Group is being reformed under the co-convenership of Martin Head.
- The SQS website is being updated under the direction of Martin Head as Vice-Chair with explicit responsibility for this task.

10. KEY OBJECTIVES AND WORK PLAN FOR THE PERIOD 2020–2024

- Develop and submit a GSSP proposal for definition of the Upper/ Late Pleistocene and its respective Stage/Age.
- Finalize analyses of candidate GSSPs for the Anthropocene, and submit a proposal for formalization to the SQS
- Continue re-investigation of the GSSP for the Gelasian Stage (and Lower Pleistocene Subseries, Pleistocene Series, Quaternary System) at Monte San Nicola, Sicily.
- Explore the possibility of a second stage for the Middle Pleistocene, based around the increasingly well-recognized Mid-Brunhes Transition.
- Continue to examine the fine-scale subdivision of the Quaternary.
- Continue to develop/update detailed correlation charts for the Quaternary (Cohen & Gibbard, 2019, *Quaternary International*, is the latest version).

Respectfully submitted:

Jan Zalasiewicz, Chair SQS; Adele Bertini, Secretary SQS, Liping Zhou, Vice-Chair SQS, Martin Head, Vice-Chair SQS.

20th November, 2021

APPENDIX

Names and Addresses of Current Officers and Voting Members of SQS

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List Of Working (Task) Groups and their Officers

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