

1. TITLE OF CONSTITUENT BODY and NAME OF REPORTER

Subcommission on Triassic Stratigraphy (STS)

Officers reporting: Hounslow, M.W (Chair of STS).

2. OVERALL OBJECTIVES AND FIT WITHIN IUGS SCIENCE POLICY

- Rationalization of global chronostratigraphical classification for the Triassic.
- Intercalibration of all types of stratigraphies, integrated zonations, and recognition of globally- significant data to achieve this.
- Establishment of physical, cyclostratigraphic and chemo-stratigraphic scales.
- Definition of stage boundaries and selection of GSSP sections.
- Correlation of Triassic successions and events, including marine to non-marine.
- Climatic evolution and modelling relevant to the Triassic.

3. ORGANISATION - interface with other international projects / groups

The STS is a Subcommission of the Commission on Stratigraphy. Three executive officers and 21 voting members of the STS and about 110 corresponding members. The secretary is the editor of the online *Albertiana* and manages the web site and posts for STS announcements and task group discussions. The *Albertiana* editor is supported by an editorial team of ten drawn from the voting and corresponding members.

Interfaces : a) IGCP 630: “*Permian-Triassic climatic and environmental extremes and biotic response*”, leader Zhong-Qiang Chen. Interconnection is relevant to the Olenekian and Anisian Working Groups, and some members of the Olenekian WG attended a field a meeting in Armenia on August 8 to 14th in Yerevan, for informal discussion, organised by Lilit Sahakyan. b) The non-marine project group works with IGCP 632 (“Continental Crises of the Jurassic”) and “International Permian-Triassic Workshops” organised annually by Gerhard Bachmann.

Nominated Officers for 2016-2020

Chair: Mark W. Hounslow, Lancaster Environment Centre, Lancaster University, UK;
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Vice-Chair: Wolfram M. Kürschner, UiO Department of Geosciences ,Oslo, Norway
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Secretary: Christopher A. McRoberts, Geology Department, SUNY, Cortland, New York, USA
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4. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

Support from the University of Innsbruck to assist in the running and hosting the Olenekian WG meeting 2-4th Nov. Help in kind from many individual contributors and their funding bodies to take part in the WG and project group activities.

5. CHIEF ACCOMPLISHMENTS IN 2017.

Norian GSSP: Rigo et al (in press) have a discussion and proposal paper dealing with the conodonts at Pizzo Mondello which also discusses the correlation to the other proposed Norian GSSP at Black Bear Ridge in Canada. Rigo et al (in press) propose the use of the conodont *Metapolygnatus parvus* as the primary marker for the base of the Norian. This paper, when

published should pave the way for progress on moving towards a vote on the boundary criteria and section.

Olenekian GSSP: The WG chair changed to Charles Henderson (Univ Calgary). Most of the WG met at the University of Innsbruck (2-4th Nov, 2017) and had 2 days of discussions and presentations about proposed markers and sections and their correlation potential. The issues connected with the ammonoid and conodont taxonomy were discussed in detail, as well as carbon isotope stratigraphy, sequence stratigraphy and magnetostratigraphy. Three possible levels were considered for the boundary, but in reality only two attracted the majority of the WG support. The first is the base of the 'S1 zone' (Ware et al. in Press) at the FO of ammonoid *Flemingites bhargaval* and FO conodont genus *Novispathodus*, in the Nammal Nala section (Salt Range, Pakistan). This is supported by a minor positive isotope shift and palynofloral turnover. The ammonoid and conodont features can be correlated to the proposed GSSP at Mud (India). The second level was higher within the *Novispathodus* morphocline (at around the FAD of *N. posterlongatus* or *N. waagei waageni*). This level provides a number of more easily identified forms in the *Novispathodus* group, and attracted greater support amongst the WG, since the FAD of conodont *Eurygnathodus costatus* and *E. hamadai* at this level, allows wider correlation potential into shallow water sections. This level also coincides with the base of magnetochron LT3n and the start of a major positive carbon isotope excursion, giving a range of secondary markers for wider geographic and environmental correlation. Prior to the Innsbruck meeting some members of the WG got together at the ICOS meeting in Valencia, where they (and others from outside the WG) met to discuss the conodont taxonomic issues connected with the I-O boundary faunas.

Nonmarine Triassic Project group: Larry Tanner edited a "The Late Triassic World" book to be published by Springer, which contains several articles relevant to Triassic correlations (relevant ones listed below). This project group interlinks with IGCP 632 ("Continental Crises of the Jurassic") who met in Flagstaff, Arizona, USA on 28-30 September 2017, and Paul Olsen headed up the meeting fieldtrip, which examined nonmarine Triassic-Jurassic boundary sections on the southern Colorado Plateau.

Publications of the working groups:

- Baranyi, V., Reichgelt, T., Olsen, P. E., Parker, W. G., & Kürschner, W. M. (2017). Norian vegetation history and related environmental changes: New data from the Chinle Formation, Petrified Forest National Park (Arizona, SW USA). *GSA Bulletin*. doi.org/10.1130/B31673.1
- Bertinelli, A., Casacci, M., Concheri, G., Gattolin, G., Godfrey, L., Katz, M. E., & Rigo, M. (2016). The Norian/Rhaetian boundary interval at Pignola-Abriola section (Southern Apennines, Italy) as a GSSP candidate for the Rhaetian Stage: an update. *Albertiana*, **43**, 5-18.
- Brosse, M., Baud, A., Bhat, G. M., Bucher, H., Leu, M., Vennemann, T., & Goudemand, N. (2017). Conodont-based Griesbachian biochronology of the Guryul Ravine section (basal Triassic, Kashmir, India). *Geobios*. doi.org/10.1016/j.geobios.2017.10.001
- Goudemand, N., Baud, A., Jattiot, R., Bucher, H. (in press). Induan-Olenekian boundary conodonts. *Geo.Alp*, vol. 14.
- Grădinaru, E. & Gaetani, M. (2017). Spathian to Bithynian (Early to Middle Triassic) brachiopods from North Dobrogea (Romania). The 11th Romanian Symposium of Palaeontology, September 25-30, 2017.
- Henderson, C.M. (in press). Arriving at an Induan-Olenekian Boundary GSSP. *Geo.Alp*, vol. 14.
- Horacek, M.: The marine carbon isotope curve around the Induan-Olenekian Boundary (IOB): Potential and problems. *Geo.Alp*, vol. 14.

- Horacek, M., Krystyn, L., Brandner, R. (in press). Significance of *Eurygnathodus costatus* and *Eurygnathodus hamadai* as indicators for the Dienerian-Smithian boundary (DSB): a study in the Dolomites (N-Italy) *Geo.Alp*, vol. 14.
- Hounslow, M.W. (in press). Magnetostratigraphy at the Induan-Olenekian boundary in a global context: relationships with other correlation tools. *Geo.Alp*, vol. 14.
- Korte, C., Thibault, N., Ullmann, C. V., Clémence, M. E., Mette, W., Olsen, T. K., & Ruhl, M. (2017). Brachiopod biogeochemistry and isotope stratigraphy from the Rhaetian Eiberg section in Austria: potentials and limitations. *Neues Jahrbuch für Geologie und Paläontologie-Abhandlungen*, 284(2), 117-138.
- Krystyn, L., Brandner, R., Horacek, M., Richoz, S. (inpress). A species of the *Eurygnathodus costatus* morphocline as important auxiliary conodont marker for the waageni-date definition of the IOB in low palaeolatitudes. *Geo.Alp*, vol. 14.
- Krystyn, L., Orchard, M., Richoz, S. (in press). Revised conodont and ammonoid biochronology of the *N. waageni*-date based IOB in the GSSP candidate section of Mud (Spiti, Himalaya). *Geo.Alp*, vol. 14.
- Li, M., Zhang, Y., Huang, C., Ogg, J., Hinnov, L., Wang, Y., & Li, L. (2017). Astronomical tuning and magnetostratigraphy of the Upper Triassic Xujiahe Formation of South China and Newark Supergroup of North America: implications for the Late Triassic time scale. *Earth and Planetary Science Letters*, 475, 207-223.
- Lucas S.G. (2017) Late Triassic Terrestrial Tetrapods: Biostratigraphy, Biochronology and Biotic Events. In: Tanner L. (eds) *The Late Triassic World*. Topics in Geobiology, vol 46. Springer, Cham (pp.351-405)
- Lyu, Z., Orchard, M. J., Chen, Z. Q., Wang, X., Zhao, L., Han, C. (2017): Uppermost Permian to Lower Triassic conodont successions from the Enshi area, western Hubei Province, South China. – *Palaeogeography, Palaeoclimatology, Palaeoecology*, doi.org/10.1016/j.palaeo.2017.08.015.
- Maron, M., Muttoni, G., Dekkers, M. J., Mazza, M., Roghi, G., Breda, A., & Rigo, M. (2017). Contribution to the magnetostratigraphy of the Carnian: new magneto-biostratigraphic constraints from Pignola-2 and Dibona marine sections, Italy. *Newsletters on Stratigraphy*, 50, 187-203.
- Rigo, M., Mazza, M., Karádi, V., & Nicora, A. (2017). New Upper Triassic Conodont Biozonation of the Tethyan Realm. In: Tanner L. (eds) *The Late Triassic World*. Topics in Geobiology, vol 46. Springer, Cham (pp. 189-235).
- Rigo, M., Mazza, M., & Nicora, A. (in press). The FAD of *Metapolygnathus parvus* Kozur, 1972 (Conodont) as primary marker for the Norian GSSP (Upper Triassic). *Rivista Italiana di Paleontologia e Stratigrafia*.
- Ware, D., Goudemand, N., Bucher, H., Schneebeil-Hermann, E., Hochuli, P., Bruhwiler, T., Roohi, G. (in press). A proposal for a multiproxy definition of the Induan-Olenekian Boundary and its corresponding GSSP candidate at Nammal Nala (Salt Range, Pakistan). *Geo.Alp*, vol. 14.
- Zaffani, M., Agnini, C., Concheri, G., Godfrey, L., Katz, M., Maron, M., & Rigo, M. (2017). The Norian “chaotic carbon interval”: New clues from the $\delta^{13}\text{C}_{\text{org}}$ record of the Lagonegro Basin (southern Italy). *Geosphere* ; 13, 1133–1148. doi.org/10.1130/GES01459.1.
- Zhang, C., Bucher, H., & Shen, S. Z. (2017). Griesbachian and Dienerian (Early Triassic) ammonoids from Qubu in the Mt. Everest area, southern Tibet. *Palaeoworld*, 26, 650-662
- Zhang, L., Orchard, M. J., Algeo, T. J., Chen, Z. Q., Lyu, Z., Zhao, L., & Liu, S. (2017). An intercalibrated Triassic conodont succession and carbonate carbon isotope profile, Kamura, Japan. *Palaeogeography, Palaeoclimatology, Palaeoecology*. doi.org/10.1016/j.palaeo.2017.09.001

6. SUMMARY OF EXPENDITURE IN 2017:

Support for the Olenekian WG meeting in Innsbruck, Nov 2-4, 2017	£1250
Web hosting for Albertiana-sts.org	\$480

7. SUMMARY OF INCOME IN 2017:

None other than from the ICS

8. BUDGET FROM ICS IN 2017

\$4000,

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

- Norian GSSP: With the publication of Rigo et al. (in press), the obstacles in the way of the working group should be relieved. In 2018, the Norian working group plan to move forward towards a vote on the marker and section for this boundary, with its timing pending more formal discussions .
- A field meeting to the Pignola-Abriola section in Italy, so the Rhaetian Working Group can examine and discuss this new proposed section in more detail. The additional data for $\delta^{13}\text{C}_{\text{org}}$ at Pignola-Abriola to fill the gap over the proposed boundary interval should be published.
- The Olenekian WG chair, is preparing a summary document for distribution to all the Olenekian WG members in early 2018, and the WG plan is to have discussions in spring-summer 2018 about this document. Then the WG plan to proceed to a final formal vote on the primary marker and the GSSP section before end of 2018.

10. KEY OBJECTIVES AND WORK PLAN FOR 2016-2020

- The proposed Anisian GSSP at Desli Caira (Romania) has failed to yield detailed published work on the ammonoids, so the STS executive will elicit a new proposal on a different section, probably in China, being lead by a different WG chair.

APPENDIX [Names and Addresses of Current Officers and Voting Members]

STS Chair: Mark W. Hounslow, Lancaster Environment Centre, Lancaster University, UK;
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~110 STS corresponding members, not listed here			

Chairs of Working Groups:

Base Rhaetian Working Group, [M. Balini](#).

Base Norian Working Group, [M. W. Hounslow](#).

Base Carnian Working Group, [M. Gaetani](#), Task Group work completed. *

Base Ladinian Working Group, [A. Baud](#), Task Group work completed. **

Base Anisian Working Group, [M. Balini](#).

Base Olenekian Working Group, [C. M. Henderson](#).

Base Induan Working Group, [Yin Hongfu](#), Task Group work completed. ***

Non-marine Boundaries Project Group, [S. G. Lucas](#).