

SUBCOMMISSION ON TRIASSIC STRATIGRAPHY

ANNUAL REPORT 2008

1. TITLE OF CONSTITUENT BODY and NAME OF REPORTER

International Subcommittee on Triassic Stratigraphy

SUBMITTED BY

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2. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

Rationalization of global chronostratigraphical classification.
Intercalibration of fossil biostratigraphies, integrated zonations, and recognition of global data.
Establishment of magneto- and chemo-stratigraphic scales.
Definition of Stage boundaries and selection of global stratotype sections.
Correlation of Triassic rock successions and events, including marine to non-marine.
Climatic evolution and modeling.

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 Triassic geology world-wide; attracting competent students and research workers to the discipline; and fostering an increased awareness among individual scientists world-wide of what related programs are being undertaken.

3. ORGANIZATION

STS is a Subcommittee of the International Commission on Stratigraphy.
Officers (chairman, two vice-chairmen, secretary), Editor/ Webmaster of newsletter *Albertiana*, voting members (25), and corresponding members (~100). The Secretary hosts a web site for STS announcements and task group discussions.

Subcommittee members represent a broad spectrum of specialized stratigraphical disciplines from those countries or regions where Triassic rocks are extensively studied in relation to fundamental and/or applied geological research. Current research activities and future plans are communicated through publication of the bi-annual STS newsletter *Albertiana* as both hardcopy and web release.

3a. Officers for 2004-2008:

Chair: Dr. Michael J. Orchard, Canada
Vice-Chair: Prof. Marco Balini, Italy
Vice-Chair: Prof. Yin Hongfu, China
Secretary: Prof. Christopher R. McRoberts, USA

3b. Officers for 2008-2012:

Chair: Prof. Marco Balini, Italy
Vice-Chair: Dr. Mark Hounslow, UK
Vice-Chair: Prof. Jinnan Tong, China
Secretary: Prof. Christopher R. McRoberts, USA

The official newsletter of the STS is *Albertiana*, printed twice in the year in Utrecht (The Netherland) and downloadable at the website:

<http://www.bio.uu.nl/%7Epalaeo/Albertiana/Albertiana01.htm>

The web site of the STS is hosted at SUNY – Cortland, where all the information on the Subcommission activities are available:

<http://paleo.cortland.edu/sts/>

4. INTERFACES WITH OTHER INTERNATIONAL PROJECTS

IGCP Project 467: Triassic time and trans-Panthalassan correlations

IGCP Project 572: Restoration of marine ecosystems following the Permian-Triassic mass extinction: Lessons for the present (2008-2012)

5. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2008

Publications

Contributed papers from the Svalbard meeting, 2006.
2008. Boreal Triassic 2008. Special Issue, Polar Research.

Abstracts and field guide book of the Bad Gaisern Meeting, 2008
Berichte der Geologischen Bundesanstalt, v. 76, about 100 pp. Wien.

Proceedings of “The Triassic climate” workshop, Bolzano/Bozen, 2008
2009 Special Issue, *Palaeogeography, Palaeoclimatology, Palaeoecology*, deadline for the submission: december 2008.

One volume of *Albertiana* will be printed this year
#37. Published December 2008, about 90 pages.

The primary aim of *Albertiana* is to promote the interdisciplinary collaboration and understanding among members of the Subcommission and within this scope serves as a platform for announcements, meeting reports, business minutes, reviews, and Triassic literature compilations as well as preliminary notes, progress reports, and articles on Triassic research. Electronic versions are also available in PDF format at <http://www.bio.uu.nl/%7Epalaeo/Albertiana/Albertiana01.htm>.

Meetings:

3-6 June 2008. Bolzano/Bozen, Italy. International workshop on “The Triassic climate”, with about 60 participants from 11 countries. New data on the climate during the Early, Middle and Late Triassic were presented. Very interesting point of the workshop was the meeting of specialists of continental/transitional successions with specialists on marine sequences. This lead to discuss the

climate record also with the perspective of marine-land correlations. The workshop, very well organized at the Naturmuseum Südtirol, was very successful with 26 oral presentations and 11 posters.

28 September-2 October 2008. Bad Gaisern, UNESCO world heritage site Dachstein-Hallstatt/Salzkammergut, Austria. International workshop on the *Upper Triassic subdivisions, zonations and events*. Thirty-three people from 12 countries attended the meeting. The state of the art of the Upper Triassic chronostratigraphic scale was reviewed and discussed during the indoor session. The field trip allowed the participants to visit historical sites in the Hallstatt area such as Feuerkogel and Sommerkogel, as well as the Norian/Rhaetian GSSP candidate section at Steinbergkogel, and the Norian/Rhaetian platform sequences of the Dachstein Massif. The visit of Steinbergkogel was very impressive for the amount of excavations and sampling carried out by the group led by L. Krystyn (Vienna University). New data on the Carnian/Norian boundary sections in North America and Sicily (Italy) were also presented.

Progress on outstanding Triassic GSSPs:

Induan-Olenekian:

In 2007 this Task Group improved upon correlations between the two candidate sections Chaohu (China) and Mud (Spiti, India). Especially the quality of the conodont, isotope and magnetostratigraphic records of the two sections were debated. Two rounds of votes were organized and at majority the Task Group members voted for the FAD of conodont *Neospathodus waageni* at level MO4-13A3 of Mud O4 section (India). The preparation of the final dossier has been delayed to the end of the 2008.

Olenekian-Anisian:

Two boundary proposals were presented in Albertiana #36 (2007). The first proposal was in progress since 6 years from the main task group at Desli Caira (Gradinaru et al.) on the basis of the FAD of the conodont *Chiosella timorensis* supported by multidisciplinary data. The second proposal is new and formally proposes the base of the magnetozone MT1n at the same section (Hounslow et al.). The two options were discussed during the Bad Gaisern meeting in September, 2008. The conodont specialists unanimously supported the FAD of *C. timorensis* as the best marker event for the O-A boundary, as already stated by Gradinaru et al., 2006 (Albertiana #34). After discussion, the Task Group leader agreed to publish a short report with the description of the new ammonoid taxon *Deslicairites* and to submit a formal proposal based on the FAD of *Chiosella timorensis* whose significance will be discussed in detail. Dead line will be Spring 2009.

Ladinian-Carnian

The discussion on the boundary marker event and on the candidate section ended in 2007 with the general agreement on the definition of the GSSP at level SW4 of the Prati di Stuores/Stuores Wiesen (Dolomites, Italy) with the first occurrence of the ammonoid *Daxatina canadensis*. The final proposal was printed on Albertiana #36 by Mietto et al. and the proposal was voted by the Task Group at the end of 2007, and by the Voting members of the Subcommittee at the beginning of 2008 – the outcome of both votes were unanimous. The proposal is currently being considered by the ICS. A manuscript illustrating the correlations between the three most important sections in the world for this boundary (Prati di Stuores, Italy; South Canyon, USA and Mud, Spiti), written in cooperation by most of the Task Group members, is in progress.

Carnian-Norian

The discussion of the Task Group is now restricted to two sections: Black Bear Ridge (Williston Lake, British Columbia, Canada) and Pizzo Mondello (western Sicily, Italy). In 2008, at the Bad Goisern meeting, the progress of the research on Pizzo Mondello was illustrated with two presentations on conodonts (Mazza & Rigo) and on halobiids (Levera & McRoberts). Some problems with the correlations of the first occurrence of *Metapolygnathus echinatus*, suggested boundary marker (Orchard, 2007, Albertiana #36), have been emphasized. Mazza will visit Orchard in Vancouver in 2009 and they will compare and discuss at length the two conodont records of the candidate sections. The new data on halobiids from Pizzo Mondello and in particular the discovery of *Halobia radiata*, are very useful for improving the global correlations. Levera will visit McRoberts in 2009 to compare the collections from Pizzo Mondello and Black Bear Ridge and to discuss the correlations. The new biostratigraphic data from Pizzo Mondello have been calibrated with the magnetostratigraphic samplings carried out in 2001 and 2004 by Muttoni et al. Balini proposed a workshop in Sicily for September 2009 or May 2010 as final workshop for the Task Group.

Norian-Rhaetian

The section at Steinbergkogel in Austria is still the best section for the definition of the boundary. The discussion of the Task Group this year was mostly devoted to the comparison of different possible marker events and the Task Group selected by ballot the conodont *Misikella posthernsteini*. This key point was also discussed during the Bad Goisern meeting in September. A final proposal for the Steinbergkogel section is announced by the end of 2008.

6. CHIEF PROBLEMS ENCOUNTERED IN 2008

In 2008 the activities of the Subcommittee have been slightly slackened with respect to 2007. One of the reasons is related to the end of IGCP 467. In 2007 important deadlines lead to high output of new data and results (e.g., the two volumes of the Albuquerque meeting and Albertiana #36; see STS report 2007) while most of the members dedicated 2008 to data collection. Another reason is the complete change of the Officers that took place with the 33^o IGC.

Several STS members report problems with scarcity or even lack of funds. After the end of IGCP 467, the activities of the STS are going to be rather strongly affected by lack of financial support. The IGCP 572 might provide opportunity to organize meeting but the stratigraphic interval that is covered by this programme is only the Lower Triassic.

7. SUMMARY OF EXPENDITURES IN 2008 (in US\$)

ICS FUNDING	
Subcommission allocation	□ 1600
Travel/ contingency	□ 900
TOTAL	□ 2400
STS EXPENDITURES	
<i>Bad Goisern</i> meeting	□ 800
Chairman's participation in Oslo IGC	□ 900
Albertiana	□ 800
TOTAL	□ 2400

8. WORK PLAN, CRITICAL MILESTONES, ANTICIPATED RESULTS AND COMMUNICATIONS TO BE ACHIEVED NEXT YEAR (2009):

Meeting/field workshop schedule

June-July IGCP 572 First annual meeting and symposium “Early Triassic ecosystems” at western United States. Field trip to western US. Correspondence: M.L. Fraiser, University of Wisconsin-Milwaukee.

October, 2009. IGCP 572 Second annual Meeting and field workshop in southern Turkey. Correspondence: S. Crasquin, Université Pierre et Marie Curie, Paris.

September, 2009 or May 2010. Triassic workshop in western Sicily. The workshop will include an indoor session and a field excursion on the Upper Triassic platform and basin successions of the area between Palermo, Trapani and Sicani mountains. The Pizzo Mondello section, candidate for the definition of the GSSP of the Norian Stage will also be visited. The date of the workshop depends on the amount of financial support available in 2009. Correspondence: M. Balini, University of Milano and P. Di Stefano, University of Palermo.

GSSP deliberations

The I-O Boundary: The final dossier is expected by the end of 2008.

The O-A Boundary: Two competing GSSP proposals based on fossils and on magnetozone on the same Desli Cairra section (Romania) have been submitted to the Task Group. Discussions after the second proposal expanded the timing on the final decision, that has been delayed to Spring 2009.

The L-C Boundary: The GSSP selection procedure has been completed in June 2008 with the ratification by the IUGS of the GSSP defined with the first occurrence of the ammonoid *Daxatina canadensis* in the level SW4 of the Prati di Stuares/Stuares Wiesen section, Dolomites, Italy. The final presentation of the GSSP on Episodes is scheduled for 2009.

The C-N Boundary: The comparison and correlations between Black Bear Ridge (B.C., Canada) and Pizzo Mondello (Sicily) still require time and discussion. Final proposals are expected by the end of 2009.

The N-R Boundary: A first ballot on the boundary event has been distributed in June. The first boundary option was the FAD of the conodont *Misikella hernsteini*, that got 24% of votes. The second option was the FAD of the conodont *Misikella posthernsteini*, that was approved with the 66% of the votes. A final proposal for the Steinbergkogel section, Austria is expected by the end of 2009.

9. BUDGET AND ICS COMPONENT FOR 2009 (in US\$)

Albertiana - STS Newsletter production	□ 1000
Support for meetings of Middle and Upper Triassic Task groups,	□ 3000
TOTAL	□ 4000

Potential funding sources outside IUGS

- Dept. of Geosciences, University of Utrecht provides facilities for the production of Albertiana and hosts its web-site.
- Dept. of Geosciences, Cortland, New York hosts an STS website.

- National research and travel grants provide support to individuals, and host institutions provide in-kind support to the executive and task group chairs.
- Because of lack of IGCP financial cover, in 2009 no funding are available for the organization of meetings of the Middle and Upper Triassic Task Groups.

10. REVIEW CHIEF ACCOMPLISHMENTS OVER PAST FIVE YEARS (thru 2007)

Organization

Renewal of STS voting and corresponding membership in 2001. Voting membership was reduced from 31 to 26, and a broader geographical and disciplinary base established. This was the first significant turnover of voting members since the inception of the STS. A summary of all members' research interests was published in *Albertiana* 26. Four new GSSP Task Group chairs were appointed. A second renewal took place in the Fall of 2004 with 11 new voting members amongst 25: this addressed the ICS recommended limit for terms served as well as lapsed members. A second web site was created to supplement that of *Albertiana* and host discussion groups.

Meetings/ workshops

1. Field meeting in Tulcea, Dobrogea, Romania, 7-10 June, 2000. Prospective O-A boundary.
2. International Symposium on the Global Stratotype of the Permian-Triassic boundary and the Paleozoic-Mesozoic events. Changxing, South China, August 2001
3. International Conference in Oman: Permo-Triassic deposits: from shallow water to base of slope.
4. Field workshop on Middle Triassic boundaries, Veszprum, Hungary, September, 2002.
5. *Extinction events, faunal turnovers, and natural boundaries within and around the Late Triassic.* Vancouver, Canada. May 25th -28th, 2003. Conodont workshop on the Carnian-Norian boundary.
6. *Triassic geochronology and cyclostratigraphy* a field symposium, September 11th -15th 2003. Focus on Secada core research and Middle Triassic time scales. Conodont workshop on the Olenekian-Anisian boundary.
7. Field workshop in Spiti, India, 26th June-6th July 2004. Conodont workshop on the Ladinian-Carnian boundary.
8. International Geological Congress, Florence, Italy, August 20-28, 2004. G22-06: Triassic in Tethys Realm; DWO-09: Upper Triassic boundaries.
9. Meeting on *Triassic Chronostratigraphy and Biotic Recovery*. Chaohu, China, May 23-25, 2005. Focus on I-O boundary
10. Symposium on *Circum-Panthalassa Triassic Faunas and Sequences*, at INTERRAD conference. Te Papa Tongarewa, Museum of New Zealand, in Wellington, Wellington, New Zealand. March 19-24, 2006.
11. Symposium on *Triassic Conodonts: Taxonomy and Time Scales*, at the First International Conodont Symposium (ICOS1), in Leicester, England, July 17-21, 2006.
12. Conference, *The Boreal Triassic*. Longyearbyen, Svalbard, Arctic Norway, August 16-20, 2006.
13. International meeting on *The Global Triassic*. Albuquerque, New Mexico, USA. May (19-)23-25, 2007.
14. Field workshop on the *Carnian-Norian boundary*, Williston Lake, NE BC, Canada. May 27-31, 2007.
15. Symposium, *The Triassic climate*, Bolzano/Bozen, Italy, June 3-6, 2008.
16. Symposium and field workshop, *Upper Triassic subdivisions, zonation and events*, Bad Goisern, Austria, September 28-October 2, 2008.

Publications

15 issues of *Albertiana* (#24-37) were published in 2000 thru 2008. Each of these issues was made available for download from the web.

Abstract volumes/ field guides prepared for meetings in Romania, Oman, Stuores, Felsoors, Vancouver, St Cristina, Spiti, Chaohu, Wellington, Leicester, Longyearbyen, Albuquerque, Bolzano and Bad Goisern.

Task groups

The **Permian-Triassic boundary** was agreed and ratified: the first appearance of the conodont *Hindeodus parvus* at the base of bed 27c, within the Yinkeng Formation at Meishan, Changxing County, Zhejiang Province, South China. A formal celebration at the GSSP took place during August 2001.

The **Induan-Olenekian boundary** Task Group, formed in 1997, reviewed the options for a GSSP in the Russian Far East but found them lacking because of strong remagnetization of Triassic rocks and poor recovery of I/O conodont assemblages. A section in Chaohu, Anhui Province, China subsequently became the focus of intensive study. Ammonoid and conodont biostratigraphy, magnetostratigraphy, and chemostratigraphy were undertaken. The FAD of the conodont *Neospathodus waageni* was identified as a potential GSSP datum: it lies 26 cm below the FAD of the flemingitid ammonoids, and is located slightly prior to the top of the second Triassic normal magnetozone, and prior to the peak of the first Triassic positive excursion of $\delta^{13}\text{C}$. A preliminary conodont biostratigraphy for Chaohu was summarized in *Albertiana* #29 (2004), and the ammonoids described in *Albertiana* #31. This boundary and proposed GSSP was the focus of a meeting held in China during June 2005, at which time many members of the task group were able to examine the section. Several publications on Chaohu appeared in 2006 (see *Albertiana* #33 and 34), including an account of the conodont succession, and papers on the bivalves, ammonoids and palynomorphs.

After 2004 field work carried out in Mud, Spiti, an evaluation of the Mikin Fm. for establishing an Induan-Olenekian boundary GSSP candidate began (see *Albertiana* #35). The rocks include top *Gyronites*, complete *Flemingites*, and basal *Euflemingites* ammonoid intervals. Three boundary options based in ammonoids were suggested and provisionally tied to the FAD of *Neospathodus waageni* subspp. Initial conodont studies identified useful taxa common to Chaohu. The ammonoid record appears superior to that at Chaohu but the section lacks a magnetostratigraphy. Both the proposal and studies on the conodonts and C-isotopes from Spiti appeared in *Albertiana* #36, as did an account of the considerable discussion on this boundary that took place during and after the Svalbard meeting.

Two ballots were organized in 2007, based on the FAD of *Neospathodus waageni* at Mud and at Chaohu. Mud got the majority of votes at the end of 2007. The final proposal is expected for the end of 2008.

A field workshop was held at Desli Cair, in Dobrogea, Romania, in June 2000, to view the **Olenekian-Anisian boundary** candidate. Major work was undertaken on ammonoid, nautiloid, conodont, and foraminiferid biostratigraphy. Both chemo- and magneto-stratigraphic analyses were largely completed. At the 2003 field workshop in St Christina, a conodont workshop amongst task group members agreed that the appearance of the conodont *Chiosella timorensis* at the base of bed 7 was a suitable datum for GSSP definition. Further geochemical sampling was undertaken in 2004 to fill a perceived gap in the coverage at the principal section. Further work has been undertaken on correlative sections in South China, Spiti, and South Primorye, Russia. In particular, a section at

Guandao in the Nanpanjiang Basin of Guizhou Province, South China produced an excellent dataset, including isotopic dates from about this boundary (~247 Ma).

At Desli Caira, the FAD of the conodont *Chiosella timorensis* corresponds to a significant change in the ammonoid fauna, and a little below a peak of a positive C isotope excursion; it falls within a short reversed polarity interval situated between two short normal intervals that follow the longer reversed interval in the upper Spathian. The Guandao section lacks rich ammonoid faunas but it is relatively expanded and has an excellent conodont succession and numerous dated ash beds that place the O-A boundary at 247.2 Ma. At the Svalbard meeting, E. Grădinaru presented data on the ammonoids and nautiloids of Desli Caira: the boundary is placed between beds with *Deslicairites simionescui* n. g. n. sp., *Procarnites kokeni* and other upper Spathian ammonoids below and the *Paracrochordiceras-Japonites* Beds of basal Anisian age above. Especially important for correlation with the Boreal Realm is the outstanding occurrence of olenekitids (*Deslicairites*, *?Svalbardiceras*) in the topmost Olenekian of the Tethys and of *?Karangatites* at the very base of the Anisian at Desli Caira. *Karangatites* is the zonal marker for the base of the Anisian in Arctic Siberia.

The use of the FAD of the conodont *Chiosella timorensis* as a datum for the O-A boundary was challenged due to variation in its taxonomic treatment and evolution in our understanding of the group leading to historical records of the species occurring within Olenekian strata. A study of *Chiosella* based on the collections from both Desli Caira and Guandao was undertaken in order to clarify its taxonomy and demonstrate its utility as a global index. A paper on this topic was published in *Albertiana* #34.

The proposal for the GSSP at Desli Caira was published in *Albertiana* #36 (Grădinaru et al.) that included also the report of ammonoid faunas. In the same issue of *Albertiana* a second GSSP proposal was presented by Hounslow et al. They suggested the base of the magnetozone MT1n at Desli Caira section to by pass bio-chronostratigraphic problem. This proposal is supported by an extremely interesting and detailed magnetostratigraphic correlation schemes including South China, Kcira, Desli Caira, Spitzbergen, Spain, UK, Germany and Poland.

Intensive research was undertaken on **Anisian-Ladinian boundary** GSSP candidate sections in Italy and Hungary. A dedicated task group was formed in 2001 and presentations focused on the GSSP options in the Hungary meeting of 2002. A formal task group voting membership and a schedule for the choice of base-Ladinian stratotype was agreed at the St Christina Meeting in 2003, and three alternate proposals were published in *Albertiana* #28. The choice was concluded in a series of votes within STS during 2004; the IUGS ratified the choice on 21st March 2005. The GSSP is thus defined at the top of "*Chiesense* groove", located about 5 m above the base of the Buchenstein Beds at Bagolino, northern Italy; the lower surface of the overlying thick limestone bed has the lowest occurrence of the ammonoid *Eoprotrachyceras curionii*. Secondary global markers in the uppermost Anisian include the lowest occurrence of conodont *Neogondolella praehungarica* and a brief normal-polarity magnetic zone. The GSSP level is bracketed by U-Pb single zircon age data, indicating that the boundary age is within the range 240-242Ma. A description of the GSSP was published in *Episodes*.

A field workshop in the Italian Dolomites during July 1998 focused on the section at Prati di Stuares, the subject of a formal **Ladinian-Carnian boundary** GSSP proposal. A dedicated Task Group was established in 2001. Subsequently fieldwork was carried out in two other regions: Spiti and Nevada. Studies in Spiti have included four expeditions, with two in Nevada. Crucial biostratigraphic data concerns the distinction between prospective index ammonoids *Daxatina* and *Trachyceras*, the FAD of the prospective conodont species *polygnathiformis*, and the appearance of the bivalve *Halobia*.

Work in the Dolomites included a very heavy resampling of the Prati di Stuares section which resulted in a single incomplete specimen of *Metapolygnathus polygnathiformis noah* near the bed

with the FAD of *Daxatina*. The Padova research group sought new sections in the Eastern Dolomites to better document the interval between the top of *Daxatina* beds and base of *Trachyceras aon*.

In Spiti, as in Prati di Stuoeres, *Daxatina* appears towards the top of the range interval of the genus *Frankites*, and *Trachyceras* overlaps with highest *Daxatina*. However, the FAD of the conodont *M. polygnathiformis* predates the oncoming of *Daxatina* by several meters. Doubtful *Halobia* still appear within the *Frankites* beds but well established occurrences are higher, within the beds with *Trachyceras*. The pros of the Spiti sections are the concurrent record of ammonoids, conodonts and bivalves, which allows the intercalibration of the bioevents. The cons are the remagnetization of the section, the cooked out content in palynomorphs, and the accessibility limited to the summer months, due to the altitude.

In the successions in New Pass, Nevada, *Frankites sutherlandi* overlaps the lower part of the range of *Trachyceras* gr. *T. desatoyense*, several meters above the FAD of *desatoyense*. *Halobia* appears in the same beds from where *sutherlandi* was recovered and possibly is even older. The richest beds in ammonoids of the South Canyon section overlie a sudden facies change, with the drowning of a carbonate platform. South Canyon does not appear to be a possible GSSP candidate mostly because of the facies change and the remagnetization due to the nearby Cenozoic volcanic rocks. The section is, however, of great significance for large scale correlations of North America with the Tethyan realm

M. Gaetani, the task group chair, distributed a questionnaire in June 2006 concerning the status of the boundary deliberations and the pros and cons of various fossil criteria. An outcome of this was that, in spite of a lack of an ancestor for *Daxatina*, ammonoids were favored for definition of the boundary. M. Balini, the principal worker on the ammonoid faunas of this boundary interval, visited the Smithsonian Museum for comparative studies and then completed his collections in South Canyon, Nevada. He reports a much more detailed view of the lithologic as well as of the faunal succession, with bed-by-bed data from 5 sites: A, B, D, E, F, three of which have yielded conodont fauna.

The Albuquerque Symposium (May 2007) was the most important moment for the discussion of the GSSP options. The third and last possible candidate section, South Canyon (Nevada), was visited by the Task Group during the pre-congress field trip. Several contributions on British Columbia, Nevada and Prati di Stuoeres were presented at the symposium and data were published in the New Mexico Museum Bulletin (#40 and #41: Balini et al., Balini & Jenks; Orchard; Orchard & Balini; Mietto et al.). The detailed bed-by-bed study of South Canyon, the most important site to test the correlations of the tethyan bioevents with northamerican successions, shows interesting faunal similarity with the tethyan successions. This locality, that previously was regarded to as representing the basal part of the Carnian in North America actually yields typical Upper Ladinian fossils in the lower part, such as *Frankites sutherlandi*, *Metapolyganthus intermedius* and bivalves of the group of *Daonella elegans*. The stratigraphic position of *Daxatina* is also very similar with respect to the Tethys. The upper part of the range of the overlaps with the lower part of the range of *Trachyceras*.

The significance of the new data and the selection of the marker event for the definition of the GSSP of the Carnian stage was discussed during the Business Meeting of the STS. The FO of *Metapolyganthus polygnathiformis*, previously considered as possible marker for the base of the Carnian, was no more supported by the conodont specialists while the FAD of *Daxatina canadensis* achieved the general consensus. A final dossier was published in *Albertiana* #36, and the proposal was voted by 72% of the Task Group members.

The Task Group on the **Carnian-Norian boundary** was established in 2001. Key sections in Canada, Sicily, Slovakia, Turkey, and Oman have been studied resulting in an integrated bio-, magneto- and chemostratigraphic cross-correlation of key sections in the Tethys. The Pizzo Mondello section in Sicily contributes a magnetostratigraphic profile tied to a preliminary conodont zonation

for the C-N boundary interval in Tethys. Alternate views of its correlation with the cyclostratigraphically calibrated Newark non-marine successions, place the base of the Norian at about 214 Ma or 228 Ma. A preliminary new conodont zonation from a potential GSSP at Black Bear Ridge, Western Canada was presented during a formal Workshop on Upper Triassic boundaries at the IGC in Florence in 2004.

Discussions during ICOS1 centered on the suitability of key CNB conodont taxa for intercontinental correlation. It was agreed amongst those present that the FAD of *Epigondolella quadrata*, a higher level than those previously considered, might be a suitable index but this was not widely supported. New work in both Canada and Sicily was planned.

New integrated biostratigraphic investigations at Pizzo Mondello started at the end of 2006. This project is also supported by three PhD theses of Milano and Padova Universities. Two of them focus on conodonts and halobiids. Preliminary results were presented at the Albuquerque meeting (May 2007) and a more advanced report was printed in *Albertiana* #36 (Nicora et al.). The biostratigraphic record of Pizzo Mondello is more complete than reported in literature. Besides conodonts, new ammonoids, halobiids and radiolaria were documented. Ammonoids document the last two chronozones of the Carnian and the first zone of the Norian. Halobiids also document the Upper Carnian and the Lower Norian. The radiolarian faunas although documented in relatively few samples are very rich with more than 45 taxa.

A Norian-Rhaetian boundary Task Group was formed in 2001. Sections in western Canada, USA, and Austria were studied and produced important ammonoid, bivalve, and conodont data. Magnetostratigraphic and chemostratigraphic studies were undertaken in Queen Charlotte Islands, Canada. Rock magnetism carried a Cretaceous overprint. A carbon isotopic anomaly was identified at a potential boundary where radiolarians show distinctive faunal change and which is the FAD of the conodont *Epigondolella mosheri*, which approximates the Amoenum Zone in North America. A field workshop in the Gabbs Valley Range of Nevada in March 2005 included sampling of both N/R and T/J boundary strata. Palynology results were disappointing, but the presence of the 'Tethyan' conodont *Misikella* was confirmed - a first for the North American autochthon.

In Austria, a section spanning the NRB within Hallstatt and Zlambach Formations produced good ammonoids, pelagic bivalves, conodonts, rare radiolarians, and palynomorphs, as well as a magnetostratigraphy. A distinctive dinoflagellate change occurs midway through the Zlambach section with the FO of *Rhaetogonyaulax rhaetica*, a datum that may have potential in correlation with shallow marine and/or high latitude basins.

At Steinbergkogel, Austria, a potential GSSP candidate, the FAD of the conodont *Misikella posthernsteini* was proven to be isochronous with the FO of the ammonoid *Cochloceras*. This well-constrained bioevent is closely above the FO of the conodont *Misikella hernsteini* and a magnetic polarity change from a long normal to a well developed reversed interval. The distinctive dinoflagellate change, which occurs with the FO of *Rhaetogonyaulax rhaetica* in the Zlambach section, is stratigraphically higher than the other two options and corresponds to another ammonoid change with the FO of the widely distributed genera *Cycloceltites* and *Vandaites*. A formal presentation of Steinbergkogel as candidate section was done for the Albuquerque Symposium (Krystyn et al., *New Mexico Museum Bulletin* 41) and updated with magnetostratigraphy in *Albertiana* #36.

11. OBJECTIVES AND WORK PLAN BEYOND 2008.

Objective of the STS is the completion of the definition of the GSSP of the Triassic System (I-O, O-A, C-N and N-R) in two years. The second part of the 2008-2012 term will focus on the definition of the Triassic Substages.

Work plan: 2009 2 GSSP defined
2010 2 GSSP defined
2010 reorganization of the Task Groups
2011-2012 work on the substages

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

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