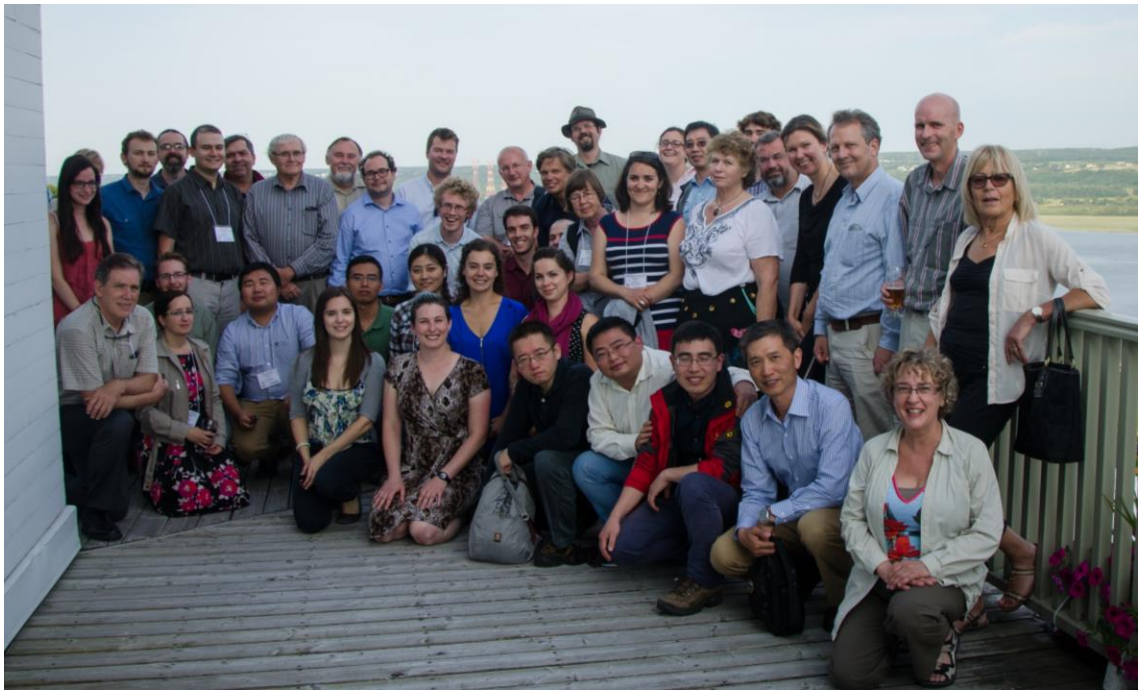
SILURIAN TIMES

NEWSLETTER OF
THE INTERNATIONAL SUBCOMMISSION ON SILURIAN STRATIGRAPHY (ISSS)
(INTERNATIONAL COMMISSION ON STRATIGRAPHY, ICS)

No. 23 (for 2015)

***Edited by* ZHAN Renbin**



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Silurian Subcommission website: http://silurian.stratigraphy.org

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Cover photo

Participants at the conference banquet at Montmorency Fall, one of the most famous geological sites near Quebec City where all three major geological domains of southern Quebec (e.g., the Precambrian basement and the Lower Paleozoic St. Lawrence Platform and the Appalachians) can be visually appreciated from one view point (photo credit: Ariane Castagner).

Silurian Times 23 for 2015 distributed March 2016

SILURIAN TIMES Number 23 (for 2015)

Chairman's Corner

Dear Silurian Colleagues,

2015 was another active year for the ISSS. Our joint meeting with the IGCP 591 in Quebec City, Canada, was an outstanding success. I would like to give my thanks to André Desrochers, Aicha Achab, Jisuo Jin, Denis Lavoie, and Michel Malo, who worked hard to get this meeting and its field trips organized. The meeting included a pre-meeting field trip to visit excellent Silurian and other early-mid-Paleozoic exposures in Gaspé, Quebec, a one-day mid-conference trip in the Quebec City area, and post-conference excursions to Anticosti Island. The preparation of the publication of the conference proceedings in a special issue of Canadian Journal of Earth Sciences is well under way.

After the Quebec meeting several ISSS executive members and others participated in a field trip and workshop in the Czech Republic to visit a potential GSSP candidate section for the base of the Aeronian near Prague. The ISSS particularly thanks organizers Drs Petr Štorch, Štěpán Manda and Zuana Tasáryová, as well as several of their students and colleagues, for their hard work in organizing this workshop and trip. This trip also examined a section that may, in the future, be considered in the restudy of the GSSPs for the base of the Homerian, as well as other localities of interest in the region. Funding for this trip was provided by a US National Science Foundation grant to ICS. Thanks to ICS Chair Stan Finney for his support for this trip. There was also "mini-session" at the Quebec meeting to present results of study of GSSP candidate sections for these and other Silurian boundaries and discuss these results.

The inaugural Koren' Award was presented at the Quebec meeting. This award was named in honor of the late Dr. Tatiana Koren' (1936-2010), former Secretary and Vice Chair of the Silurian Subcommission (as well as member of Ordovician and Devonian subcommissions) and a global expert on graptolites who made many lasting contributions to the biostratigraphy of the Silurian System. Congratulations to the first recipient of this award, Dr. Emilia Jarochowska! Many thanks to the selection committee members: Carl Brett, Renbin Zhan, and Petr Štorch.

Through our association with IGCP 591, Silurian Subcommission members also participated in other conferences in 2015:

- 12th International Symposium on the Ordovician System (ISOS), James Madison University, Harrisonburg, Virginia, June 8–11, 2015
- An International Conference on the Rise of Animal Life: Cambrian and Ordovician biodiversification events (RALI 2015), Marrakesh, Morocco, October 5–9, 2015

The main planned highlight of ISSS activities for 2016 will be the closing meeting of

IGCP 591, which will be held in Ghent, Belgium, in association with the Cambrian, Ordovician, Silurian and Devonian subcommissions. The meeting will be held July 6-9 and will be followed by a field trip: Welsh Basin (UK) Field Trip “Revolutions that made the Palaeozoic world - Revealed in the ancient strata of Wales”. An option will be available for the final day of this trip to visit the Rheidol Gorge section in Wales, which is a candidate section for the base of the Aeronian Stage.

The circular for this meeting are included in this issue of Silurian Times and is also available on the ISSS and ICGP 591 websites.

I am now in my final year as Chair of ISSS. I would like to extend my thanks to the many colleagues who have served as voting members of ISSS over the past eight years and particularly Peep Mannik, vice-chair, and Jacques Verniers and Renbin Zhan, who have served as the secretary. I greatly appreciate the work that everyone has put in to keep the ISSS moving forward. I also wish to thank our new, incoming executives, Petr Štorch (chair) and Carlo Corradini (vice-chair), and our new voting members, Thijs Vandenbroucke, Brad Cramer and Živilė Žigaitė, for their willingness to serve the community of Silurian researchers. I think that we built a strong momentum of interest in refinement of our definitions of Silurian stages and development of high-resolution global correlation and look forward to seeing that work continue.

Looking forward to seeing you in Ghent.

Michael J. Melchin
Chair, Subcommission on Silurian Stratigraphy

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International Commission on Stratigraphy
Subcommission on Silurian Stratigraphy

ANNUAL REPORT 2015

1. TITLE OF CONSTITUENT BODY

International Subcommission on Silurian Stratigraphy (ISSS)

Submitted by:

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2. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

Mission statement

The objectives of the Subcommission relate to three main aspects of IUGS policy:

(1) The development of an internationally agreed scale of chronostratigraphic units, fully defined by GSSPs at Series and Stage levels and related to a hierarchy of units (Substages, Standard Zones, Subzones etc.) to maximize relative time resolution within the Silurian Period;

(2) Establishment of frameworks and mechanisms to encourage international collaboration in understanding the evolution of the Earth during the Silurian Period;

(3) Working towards an international policy concerning conservation of geologically important sites (such as GSSPs, global and regional stratotype sections, etc.).

Goals

- Rationalization of global chronostratigraphical classification.
- Intercalibration of fossil biostratigraphies, integrated zonations, and recognition of global datums.
- Establishment of magneto- and chemo-stratigraphic scales.
- Redefinition of stage boundaries and restudy of global stratotype sections.
- Correlation of Silurian rock successions and events, including marine and non-marine.

3a. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2015

Silurian Times No 22 was edited by the secretary, Renbin Zhan, and distributed in March, 2015, posted on the web site for the ISSS, and circulated as an email attachment to all

titular, corresponding and interested members of the Subcommission. It contained the reports on previous meetings, announcements of upcoming meetings and publications, and the latest news and recent publications on Silurian research.

The 5th International Symposium on the Silurian System was held jointly with the IGCP Project 591, Annual Meeting 2015, in Québec, Canada, July 8-11, plus pre-meeting and post-meeting field trips to Gaspé Peninsula and Anticosti Island, respectively. There was also a mid-conference trip within the Québec City area. The meeting was very well organized and attended by 68 participants from 11 different countries. Strong commendations are extended to the organizing committee of this meeting on behalf of the ISSS.

Work proceeds on the restudy of potential GSSP candidate sections for the Base of Wenlock, the Base of Aeronian and base of the Telychian stages. Six papers were presented at the IGCP 591/ISSS meeting in Québec pertaining to recent progress related to these boundaries. In addition, the working group for the Base of Aeronian Stage GSSP held a field workshop to visit a proposed candidate section in the Prague region, Czech Republic, July 29-30. Ten ISSS members participated in the field meeting, which was supported by funding from an NSF grant to ICS. The ISSS particularly thanks organizers Drs Petr Štorch, Štěpán Manda and Zuana Tasáryová, as well as several of their students and colleagues, for their hard work in organizing this trip. This trip also examined a section that may, in the future, be considered in the restudy of the GSSPs for the base of the Homerian, as well as other localities of interest in the region.

The ISSS is a key partner in IGCP 591 – The Early to Middle Paleozoic Revolution. The following additional IGCP 591 meetings occurred in 2015, involving the ISSS members of IGCP 591:

- 12th International Symposium on the Ordovician System (ISOS), James Madison University, Harrisonburg, Virginia, June 8–11, 2015
- An International Conference on the Rise of Animal Life: Cambrian and Ordovician biodiversification events (RALI 2015), Marrakesh, Morocco, October 5–9, 2015

The Chair of ISSS and a number of other ISSS members participated in STRATI 2015 — 2nd International Congress on Stratigraphy held in Graz, Austria, 19–23 July 2015. This was followed by a successful workshop focusing on databases in stratigraphy.

A new award, to be given by the ISSS once every four years at the International Silurian Symposium, was initiated at the Lund meeting in 2013 and approved in principle at the Kunming meeting in 2014 to recognize outstanding research contributions by young Silurian researchers, particularly post-graduate researchers under the age of 40. The award is named in honor of Dr. Tatiana Koren' and was presented for the first time at the Québec meeting to Dr. Emilia Jarochowska.

3b. ISSS MAJOR PUBLICATIONS IN 2015

A volume of conference abstracts and three field trip guidebooks were produced for the

Québec meeting.

A special issue of *Palaeoworld*, Volume 24, Issues 1-2, Pages 1-250 (March-June 2015), was published containing the conference proceedings from the 2014 meeting in Kunming (co-organized by ISSS, ISOS and IGCP 591). This issue is entitled "Geologic and biotic events and their relationships during the Early to Middle Paleozoic" and was edited by Renbin Zhan, Jisuo Jin and David A.T. Harper. It includes 7, 9 and 7 papers of Cambrian, Ordovician and Silurian related, respectively, and Silurian papers are mainly on systematic paleontology, biostratigraphy, chemostratigraphy, paleoecology, paleobiogeography, etc.

3c. CHIEF PROBLEMS ENCOUNTERED IN 2015

There remains the old problem related to difficulties in obtaining grants for research on stratigraphical topics and travel to meetings of Subcommission. Applications are often given low priority by national grant-awarding agencies in most countries.
Another major problem is the lack of communication between experts from developed and developing countries on those key issues related with the regional and global correlations of Silurian rocks.

4a. WORK PLAN, CRITICAL MILESTONES, ANTICIPATED RESULTS AND COMMUNICATIONS TO BE ACHIEVED NEXT YEAR (2016):

Regular updating the website for Silurian Subcommission by Junxuan Fan. We gratefully acknowledge the support of the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences for this work.

The major meeting for the ISSS for 2016 will be held in association with the final annual meeting of IGCP 591, together with the ISCS, ISOS and ISDS. This will be held in Ghent, Belgium, July 6-9 and will be followed by a field trip that is tentatively planned to examine key early Paleozoic localities in the Welsh Basin. The theme of the conference will be "A combined data-model approach to understand the Early to Middle Paleozoic Revolution".

ISSS members continue to collaborate on the process of full integration of the various regional and global biostratigraphic, lithostratigraphic, sequence stratigraphic, and chemostratigraphic scales for the entire Silurian. This integration is essential for refinement of the Silurian time scale and high-resolution correlation of Silurian events. In addition, some ISSS members are focusing on generation of new, high-resolution radiometric dates that are well constrained within the Silurian time scale. This is essential to achieve better calibration of time scale, which has been a serious weakness for the Silurian System.

4b. Specific GSSP Focus for 2016

As noted above, GSSPs currently under active restudy are the bases of Aeronian, Telychian and Sheinwoodian (base of Wenlock). Several research groups are currently undertaking studies specifically focused on candidate sections for these boundaries.

The base of Aeronian boundary working group is tentatively planning a trip to visit the third candidate section for this boundary, which is at Rheidol Gorge, Wales. The other two candidate sections were visited in 2015 (Prague region, Czech Republic) and 2014 (Shennongjia region, China). The tentative plan is to incorporate a visit to Rheidol Gorge as an optional part of Welsh Basin Transect trip that will be held in association with the ICGP591/ISCS/ISOS/ISSS/ISDS meeting in Ghent, Belgium in early July. At that point, we hope to have detailed information pertaining to all of the GSSP candidate sections for this boundary, and will then soon be in a position to propose a new GSSP.

A detailed biostratigraphic and chemostratigraphic study of a GSSP candidate section for the base of the Telychian, which is in south-western Spain, is now in press and work continues on documentation of the other main candidate section for this boundary in the Shennongjia region, China.

The Rhuddanian-Aeronian and Aeronian-Telychian Boundary Working Groups are in the process of implementing a new, innovative approach to consider the GSSP candidate sections and improving correlation among sections. It is proposed that as the data from each candidate section are assembled, all of the biostratigraphic, chemostratigraphic, and other data useful for correlation, will be assembled into a database (the Geobiodiversity Database, GBDB), along with data from other sections, globally. These data will then be studied using quantitative correlation methods, such as CONOP9 and Horizon Annealing. These methods allow for simultaneous correlation of many sections using a range of different types of stratigraphic data, producing a high-resolution correlation between all sections. This approach permits integration of data from different fossil groups that only rarely co-occur, as well as chemo- and lithostratigraphic and radiometric data, thus permitting correlation between different facies and paleogeographic regions. They also permit quantitative assessment of the precision with which particular levels at any given section can be placed within the composite succession. We feel that this may be a good approach to find a GSSP level that can be correlated globally with the highest level of precision and confidence. Presentations outlining these methodologies for Silurian GSSP research were presented at the Strati 2015 conference by Mike Melchin.

5. SUMMARY OF EXPENDITURES IN 2015

Income

Carried forward from 2014	US$1,690
ICS Allocation	US$5,000
Total	US$6,690

Expenditures

Expenses for ISSS Chair related to Silurian Symposium in Quebec, Strati 2015, Graz, and GSSP Workshop, Prague	US$2,305
Financial support for 5th International Symposium on the Silurian System, Quebec	US$4,000

Koren' Award for Outstanding Contributions to Silurian research by a young researcher	US$300
Bank fees for ISSS account	US$85
Total	US$6,690
Balance	US$ 0

In addition, ISSS received from ICS NSF funds (up to US$6,000) for ISSS members to attend a field workshop in the Prague Synform, Czech Republic, in July, 2015, and to study candidate sections for restudy of the GSSPs for the Base of Aeronian and Base of Homerian and present results of GSSP-related research. Final accounting of this fund is not yet complete but will be provided as soon as it becomes available.

6. BUDGET AND ICS COMPONENT FOR 2016

Contribution toward transportation, accommodation & registration of the Chair and Vice-Chair, to participate in the joint meeting of IGCP 591/ISCS/ISOS/ISSS/ISDS in Ghent Belgium	US$2,500
Contribution to assist other ISSS titular members to participate in the IGCP 591/ISCS/ISOS/ISSS/ISDS in Ghent Belgium	US$2,500
Contribution toward transportation, accommodation & registration of the outgoing and incoming Chair and Vice-Chair to attend IGC in South Africa	US$4,000
Financial support for GSSP working group members studying potential GSSP candidate sections for the base of Aeronian, Telychian and Wenlock.	US$5,000

The ISSS has done pioneering work in the area of restudy of previously ratified GSSPs. Recent work has shown that many of the Silurian GSSPs, all of which were ratified in the mid-1980s, have serious deficiencies in terms of their potential use as benchmarks for high-resolution global correlation. Three working groups are currently focusing on restudy of the base of the Aeronian Stage (R-A boundary), base of the Telychian Stage (A-T boundary) and the base of the Wenlock Series. Future working groups will study the other GSSPs of Silurian System. The funds will be particularly directed at young members of the working group, and members who have no access to other funds for international travel to participate this ongoing research.

The ISSS will be submitting a separate proposal for funds to support the costs of the R-A Boundary Working Group workshop and field trips to Wales to study the potential GSSP candidate section there.

Total proposed budget for 2016	US$14,000

Balance forward from 2015	US$ 0
Total requested from ICS for 2016:	**US$14,000**

Potential funding sources outside IUGS

Most of the remaining costs of preparing Silurian Times, Working Group newsletter, meetings and other activities will be met by local support from host institutions and participation by individuals through national research grants and travel grants from their own authorities.

APPENDIX

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

Over the period of 2011-2015 the Subcommission on Silurian Stratigraphy was active in several respects. The most recent of these activities are summarized above under the heading of "CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2015". In addition to those, the following are the most significant accomplishments of the past five years.

A volume of papers from the 2013 Lund meeting was published as a special issue of the journal GFF (the journal of the Geological Society of Sweden) volume 136, issue 1, 2014, pages 1-340, EPGC - Early Palaeozic Global Change, edited by Mikael Calner, Oliver Lehnert, and Per Ahlberg.

Zhan Renbin and Huang Bing (eds). 2014. IGCP Project 591 Field Workshop 2014 (with ISSS, ISOS and ISCS) Extended Summary, Kunming China, 12-21 August, 2014, Extended Summary. Nanjing University Press. 246 pp.

Zhang Yuandong, Wang Yi, Zhan Renbin, Fan Junxuan, Zhou Zhiqiang and Fang Xiang. 2014. Ordovician and Silurian Stratigraphy and Palaeontology of Yunnan, Southwest China. Science Press, Beijing, 138 pp.

The ISSS Website was moved to a more secure server in 2013 and also extensively redesigned by our webmaster, Junxuan Fan. The new web site can be found at: http://silurian.stratigraphy.org/.

A major Silurian meeting was held in Lund, Sweden, in June 2013, in association with IGCP 591, as well as the Ordovician and Cambrian subcommissions. The principal conference organizers were Mikael Calner and Oliver Lehnert. An excellent field trip visited localities in SE Sweden and the Oslo region of Norway. The proceedings of this conference were published as:

Lindskog, A. and Mehlqvist, K. 2013. Proceedings of the 3rd IGCP 591 Annual Meeting – Lund, Sweden, 9–19 June 2013. Lund University. 368 pp.

As noted above, another volume of papers emerging from the Lund meeting was published as a special issue of *GFF* in 2014.

Another recent publication focusing on Silurian research was:

Holloway, D.J. and Laurie, J.R. 2013. Siluro-Devonian Studies 2. *Memoirs of the Australasian Association of Palaeontologists*, 44, 207 pp.

ISSS members organized or participated in 15 conferences related to IGCP 591. ISSS members were also leaders in the initial planning and co-leading of IGCP 591.

The International Symposium on the Silurian System "Siluria Revisited" took place July 9-15, 2011, in Ludlow, England. There were two days of oral presentations focusing on a wide range of Silurian topics and many of the presentations were also contributions to IGCP 591. Of particular significance were the pre- and post meeting field trips that toured the type areas for the Llandovery Series in Wales and the Wenlock and Ludlow series in England. These trips gave the opportunity to a new generation of Silurian researchers to view the GSSPs for all of the Llandovery, Wenlock and Ludlow series and stages (except the base of the Llandovery, which is in Scotland). This meeting resulted in the publication of a program and abstracts volume, a field guide, which includes many new observations and interpretations of the localities, including the GSSPs visited. This field guide is available for download at: http://www.igcp591.org/books.php. In addition, a conference volume for submitted papers, was published as a special issue of *Bulletin of Geosciences* in 2012, edited by David Loydell.

The ISSS Chair has interacted with scientists at the British Geological Survey in the development of collaborative research between BGS scientists and members of the Silurian Subcommission, particularly focusing on the restudy of the type areas for the GSSPs for the Silurian, all of which occur in the UK except for the base of the Pridoli. Such work is forming the basis of future refinement of the definition and correlation of the GSSP, particularly those in Wales and the Welsh borders, including the bases of Aeronian, Telychian, Wenlock (Sheinwoodian), Homerian, Ludlow (Gorstian), and Ludfordian. Each of these GSSPs can be shown to be in need of refinement or redefinition and these features were highlighted during the Siluria Revisited field trips. New research by the BGS has resulted in considerable refinement of the stratigraphic and structural framework for this region and this will form an important basis for future deliberations regarding the merits of these GSSPs and their possible need for reconsideration. As a result, a number of the BGS researchers were key participants and co-leaders of the Siluria Revisited field trips and made substantial contributions to the field guide for that trip. The results of some of the research in the type Llandovery area were recently published in: Jeremy R. Davies, Richard A. Waters, Stewart G. Molyneux, Mark Williams, Jan A. Zalasiewicz, Thijs R. A. Vandenbroucke and Jacques Verniers. 2012. A revised sedimentary and biostratigraphical architecture for the Type Llandovery area, Central Wales. Geological Magazine, Available on CJO doi:10.1017/S0016756812000337

As part of the ongoing efforts to resolve this problem of the GSSP for the Base of the Wenlock, the ISSS voting member Dr. Petr Štorch has been working with Chinese researchers on a Llandovery-Wenlock boundary section in Ziyang, China. Another

complete and well-exposed Llandovery-Wenlock boundary section has recently found also in Ziyang where conodonts, graptolites and chitinozoans are found. Preliminary study shows potential for regional and global correlation across the L-W boundary. Detailed paleontological, sedimentological and chemostratigraphical studies are being conducted. So, at current stage, there are still no strong candidates for a new GSSP for the Base of Wenlock. As noted above, new research on this problem is under way.

Five of the ISSS Titular Members, including the Chair and Vice-Chair, were co-authors on a paper published in Lethaia in 2011, outlining a proposed, informal subdivision of the Silurian time scale into stage slices. The paper also presented a generalized carbon isotope curve for the Silurian as well as an updated proposed correlation of the North American regional stages with the global standard scale.

The ISSS Chair, with several colleagues, published the chapter on the Silurian System for the 2012 edition of The Geologic Time Scale.

Publication of a special volume of Proceedings of the Yorkshire Geological Society honouring the lifetime contributions of Dr. Barrie Rickards, a well-known and respected Ordovician-Silurian graptolite paleontologist and stratigrapher was published in November, 2011. Invited papers focus on current research in graptolites, including contributions from Silurian graptolite researchers.

IGCP 591 held a special session at the International Geological Congress in Brisbane, Australia in August, 2012, co-organized by ISSS member Kathleen Histon and ISSS chair, Mike Melchin. IGCP 591 also held its annual meeting in July in Cincinnatti, co-organized by ISSS members Carl Brett and Brad Cramer. Special symposium volumes were published from both conferences in refereed journals.

8. OBJECTIVES AND WORK PLAN FOR NEXT 4 YEARS (2016-2019)

In addition to the points listed above as "WORK PLAN, CRITICAL MILESTONES, ANTICIPATED RESULTS AND COMMUNICATIONS TO BE ACHIEVED NEXT YEAR", many of which will extend into future years, the priorities (not in order of merit) proposed for the Silurian Subcommission for the next four years include:

Research is currently under way by ISSS members, colleagues and students on the bases of Aeronian, Telychian and Sheinwoodian sections in UK, Czech Republic, Spain and China, as part of the process of selection of possible new GSSP sections. We hope to be in a position to vote on proposals for the Base of the Aeronian within the next year.

The research objectives for IGCP Project 591 are to investigate the biological, chemical and physical evolution of the ocean-atmosphere-biosphere system during this dynamic interval of Earth history by addressing in detail the relationships between climate, sea level, tectonics, biology, oceanography, volcanism, and the stratigraphic record of Early to Middle Paleozoic global planetary change. This project is being conducted in collaboration with the International Subcommissions on Ordovician, Silurian, and Devonian Stratigraphy (SOS, SSS, SDS), and will be accomplished over the five-year

duration of the project (2011-2016).

Other future ISSS field meetings and GSSP workshops remain in the planning stages.

We are working on the development of databases that would bring together and make available information from all sources associated with the Silurian researchers. One such database has been created at the Nanjing Institute of Geology and Palaeontology by Dr. Junxuan Fan, who is also Webmaster for ISSS. This database, called Geobiodiversy Database (GBDB), is fully operational and has been named as the official database of the ICS.

9. ORGANIZATION

The ISSS is a Subcommission of the International Commission on Stratigraphy. The Subcommission is organized by an Executive consisting of Chairman, Vice-Chairman and Secretary, who are all Voting Members of the Subcommission. In the Subcommission elected for 2012-2016 there are fifteen other Voting Members. The network of Corresponding Members has first of all a responsibility for communication in both directions between the Subcommission and researchers on Silurian topics in their region. Secondly they represent a broad spectrum of specialized stratigraphical disciplines from those countries or regions where Silurian rocks are extensively studied in relation to fundamental and/or applied geological research.

Current research activities and future plans are communicated through publication of an annual ISSS newsletter, *Silurian Times*, distibuted by both email attachment and as a web release.

Websites: http://silurian.stratigraphy.org/ contains newsletters, meeting announcements, discussion posting-boards, bibliography of Silurian articles, links to related sites, and other information.

Subcommission officers

Chairman: Michael J. Melchin, Department of Earth Sciences, St. Francis Xavier University, Antigonish, NS, Canada, B2G 2W5; mmelchin@stfx.ca.

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Working Task Groups

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Base of Telychian GSSP Restudy – Chair – Michael Melchin
Base of Wenlock GSSP Restudy – Chair – David Loydell

Interfaces With Other International Projects

Collaboration on IGCP Project 591, "The Early to Middle Paleozoic Revolution", which was approved and began its work in May 2011.

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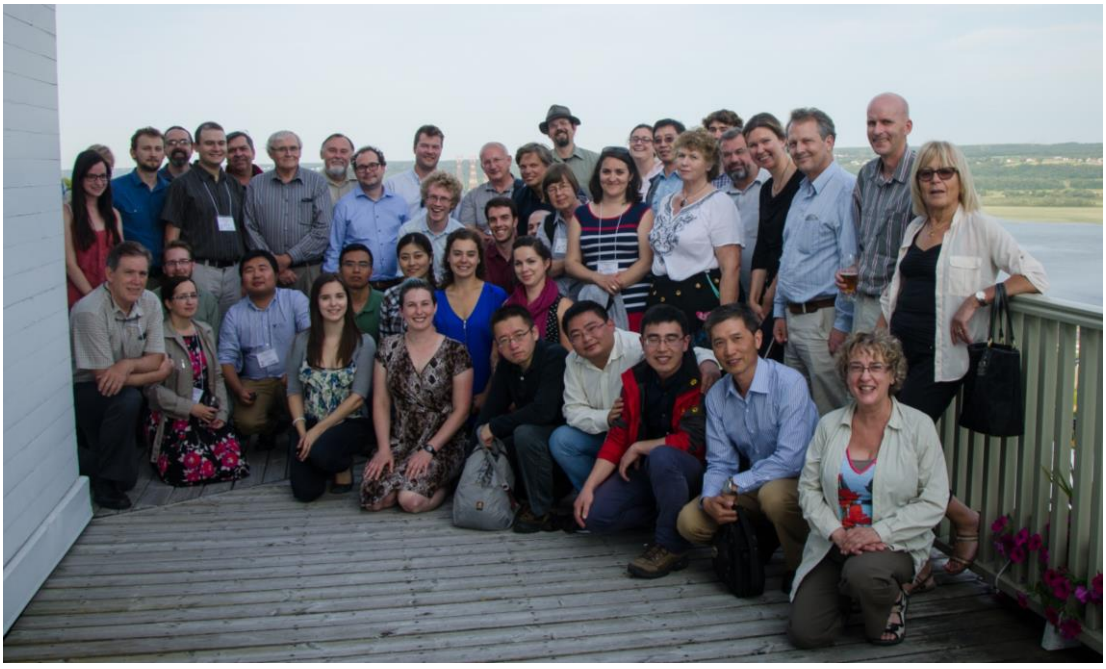
REPORTS OF ACTIVITIES IN 2015

1. The 5th International Symposium on the Silurian System and the 5th Annual Meeting of the IGCP 591

by André DESROCHERS

SIXTY five participants from 14 countries assembled in Quebec City Canada for the 5th International Symposium on the Silurian System and the 5th Annual Meeting of the International Geoscience Programme (IGCP) Project 591 – The Early to Middle Paleozoic Revolution. The aims of the joint ISSS – IGCP 591 meeting were to investigate the dynamic and important Early–Middle Paleozoic history and evolution of life and our planet and to improve our understanding of the definition, correlation and resolution of that time interval. The organizing committee was composed of André Desrochers (chairman), Aicha Achab (vice-chair), Denis Lavoie, Michel Malo, INRS-ETE, Québec, and François Clayer. More than 45 presentations during the technical and poster sessions covered a broad range of topics on the stratigraphy, sedimentology, paleontology, geochemistry, and paleoceanography. Keynote speakers, Christian Rasmussen, Renbin Zhan, and Alexandre Pohl significantly contributed to the success of these sessions. The meeting included a mid-conference excursion (The Ordovician carbonate and siliciclastic successions of the St. Lawrence Lowlands near Quebec City led by Denis Lavoie), a pre-conference geological excursion (The lower Paleozoic rocks of the Gaspé Peninsula led by Michel Malo, Denis Lavoie, and Daniel Brisebois), and a post-conference trip (Multi-Proxy Stratigraphic Analysis of the Upper Ordovician-Lower Silurian Succession of Anticosti Island, Quebec led by André Desrochers and Jisuo Jin). A thematic conference volume of papers, edited by Michael Melchin and Jisuo Jin, will be published in the *Canadian Journal of Earth Sciences* in 2016. The organizing committee is grateful to the institutional and industrial sponsors for their support: INRS-ETE, University of Ottawa, Junex Inc., Pétrolia Inc, and Hydrocarbures Anticosti. We also thank the International Commission on Stratigraphy and the IUGS/UNESCO International Geoscience Programme for their financial support for the activities of the Silurian Subcommission and IGCP 591, respectively.

Participants looking at Upper Ordovician graptolite-rich calcareous shale during the mid-conference field excursion; Cap Santé 55 km SW of Quebec City along St Lawrence River (photo credit: Ariane Castagner).



Participants at the conference banquet at Montmorency Fall, one of the most famous geological sites near Quebec City where all three major geological domains of southern Quebec (e.g., the Precambrian basement and the Lower Paleozoic St. Lawrence Platform and the Appalachians) can be visually appreciated from one view point (photo credit: Ariane Castagner).

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2. ISSS GSSP Workshop – Prague 2015: GSSPs of the Silurian stages revisited

by **Petr ŠTORCH**

The primary focus of the ISSS GSSP Workshop was on candidate sections for Aeronian, Telychian and (prospective) Homerian GSSPs. The meeting was attended by 16

participants from 5 countries – titular and corresponding members of the ISSS and additional members of the stratigraphic community interested in current agenda and research devoted to the restudy of the GSSPs of some Silurian stages and series. A one-day indoor session of the working group was held in July 29 at the Geological Institute of the Czech Academy of Sciences in Prague. A field trip on the second day (July 30) brought participants to important reference sections, including potential candidates for the Aeronian and Homerian GSSPs situated near Prague, capital of the Czech Republic.

Ten oral presentations summarized, in particular, recent progress achieved in detailed multi-proxy studies carried out at potential GSSP candidate sections: Rhuddanian-Aeronian boundary section at Hlásná Třebaň, Czech Republic; Rhuddanian-Aeronian boundary section at Shennongjia, China; Aeronian-Telychian boundary section at El Pintado Reservoir, Spain and Aeronian-Telychian boundary section at Shennongjia, China. The session culminated with presentation on analysis and testing of GSSPs using Horizon Annealing application in high-resolution correlation. Narrow focus of the meeting facilitated expert and detailed discussion on various aspects of the Silurian GSSP business.

The workshop dinner took place in Klášterní restaurant in Strahov Monastery near Prague Castle.

One-day post-meeting excursion led its participants to the central part of Lower Ordovician-Middle Devonian Prague Synform, which is paleontologically and stratigraphically most important part of the Variscan fundament in central Europe. The first stop was made at lower and middle Llandovery graptolitic black shales near Hlásná Třebaň. The section has the potential to serve as a new Aeronian GSSP and also includes a storm-dominated Hirnantian succession and the Ordovician/Silurian boundary, highlighted by the anoxic event. Graptolite-rich black shales of the early Telychian age were examined at the second stop – a railroad cut by Litohlavy water reservoir, which is a type locality of several important graptolite taxa. The upper Wenlock and Ludlow succession was visited in the Kosov Quarry (third, composite stop) with particular attention paid to Sheinwoodian-Homerian boundary strata and middle Homerian lundgreni/Mulde Event.

The workshop was hosted by the Institute of Geology of the Czech Academy of Sciences and organized in cooperation with the Czech Geological Survey, Prague. The organizing committee acknowledges financial support received from NSF through ISSS.

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3. Notes of the Business Meeting of ISSS in Quebec City in July 2015
by **ZHAN Renbin**

Time and date: 1:30 pm~3:00 pm, July 8, 2015

Place: INRS-ETE building, Quebec City, Canada

Chair: Prof. Michael Melchin (Canada)

Attendees: 29 Silurian workers and experts including 6 titular members of ISSS (Carlton Brett, Jisuo Jin, David Loydell, Michael Melchin, Petr Štorch, Renbin Zhan)

The roughly 90 minute business meeting was chaired by Prof. Michael Melchin (chair of ISSS) and included six major topics.

1. On behalf of the Silurian Subcommission, Michael Melchin expressed our sincere thanks to the organizers and volunteers of the Quebec City meeting for their wonderful organization and hard work.

2. The Koren' Award of ISSS. Michael Melchin explained the entire grocess of the establishment of this award. It was initiated at the Lund meeting in June 2013, and three titular members (Carl Brett, Petr Štorch and Renbin Zhan) were appointed to constitute a working group to discuss the name of this award and the criteria for selecting candidates, and to behave as a nomination committee to select the first winner of this award. After several rounds of discussion among titular members and some senior experts of ISSS, the Subcommission has formally decided that this award to be called "the Koren' Award" and to be awarded to one person every four years at the Silurian symposium. The winner will get a certificate signed by the chair of ISSS and $300 US cash as bonus.

3. Selection of new xxecutives and titular members of ISSS. Michael Melchin was telling the audience that he is finishing his second term as the chairman of ISSS and is stepping down at the next IUGS congress in South Africa in September 2016. He suggested to select new executives for ISSS, and Carl Brett, David Loydell and David Holloway were appointed to form a nomination committee. Mike also suggested that some more young titular members could be added to ISSS because there are relatively fewer voting members compared with other subcommissions concerning the number of members (currently 18 for ISSS).

4. New corresponding members for ISSS. As usual, Michael Melchin was asking for nominations for new corresponding members for ISSS. Jiri Fryda (nominated by Petr Štorch), Jim Tomocar (by Carl Brett) and Alissa Bancroft (by Brad Cramer) were nominated and approved by all attendees at the business meeting.

5. Upcoming activities. According to plan, there are four meetings or symposiums related to Silurian on the agenda. They are: the STRATI 2015 in Austria organized by ICS in July 2015; the field meeting on the Silurian GSSPs' restudy in Prague organized by Petr Štorch in late July 2015; the closing meeting of IGCP 591 in conjunction with ISCS, ISOS, ISSS and ISDS in Ghent (Belgium) organized by Thijs Vandenbroucke in July 2016; and the IGC in South Africa organized by IUGS in September 2016.

6. Reports of various working groups of ISSS. There are currently three working groups that are actively conducting their restudies on those problematic Silurian GSSPs.

The base of Wenlock. This working group is led by David Loydell who said there are no essential and important new achievements in the restudy of this boundary. Both candidate sections in Ziyang (central China) and Gotland (Sweden) have apparent merits and demerits. Further investigations are earnestly needed.

The base of Aeronian. Petr Štorch is leading this working group. There are three candidate sections that are under study by different groups of experts: the section in the Prague Basin (led by Petr Štorch), in western Wales (led by Michael Melchin and Thijs Vandenbroucke) and in Shennongjia of northwestern Hubei Province (central China) (led by Junxuan Fan and Michael Melchin). Some titular members suggest the possibility to establish one or even two auxiliary stratotype section(s) for this boundary. Michael Melchin noted that ICS does not recognize auxiliary stratotype(s) but each subcommission could make their own decision in selecting one or two auxiliary stratotype(s) for a particular boundary. The possibility to establish one or even two auxiliary stratotype(s) for the base of Aeronian needs further discussion in the following years.

The base of Telychian. This working group is led by Michael Melchin, and there are

also three candidate sections for this particular boundary: the section in northern Spain, and in Shennongjia of northwestern Hubei Province (central China). All these three sections have their own characteristics in those leading fossil groups, such as graptolites, chitinozoans, conodonts, but none of them is perfect to be selected as a stratotype. More investigations, particularly chemostratigraphic study, need to be conducted on these sections.

In addition, some more discussions on other Silurian issues were also initiated by the attendees, particularly those titular members of ISSS. Jisuo Jin suggested the possibility to subdivide the Silurian Period into several time slices roughly corresponding to those biostratigraphical zones. Frank Brunton strongly suggests that ISSS should establish a refined regional stratigraphical correlation chart for the Silurian System which will be very important both academically and practically.

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4. Reports on the selection of new Executives and Voting Members of ISSS
by **ZHAN Renbin**

According to the suggestion from Prof. Michael Melchin, chairman of ISSS, Carl Brett, David Loydell and David Holloway were appointed as the nomination committee for the selection of both new executives and new voting members for ISSS. For more than three months, various nominations were initiated from different titular members and former executives of ISSS. After a formal procedure, the following results were reported to ICS and IUGS for ratification by Prof. Michael Melchin.

New Executives of ISSS

Since the nomination committee emailed out a particular notice, they received several nominations. Once they got a nomination, they contacted the nominee at their earliest convenience asking for his (her) own willingness. Eventually they focus two candidates: Petr Štorch (to be elected as a new chair) and Carlo Coradini (to be elected as a new vice chair), and then they asked for a general election among the current titular members of ISSS. The result is that all valid votes support both nominations. Congratulations to Petr and Carlo!

New Voting Members of ISSS

Because ISSS has relatively fewer titular members compared with other subcommissions of ICS, the suggestion of taking some new young Silurian experts into the Subcommission has been initiated. Since the notice for nominating new Silurian titular members was sent out by the nomination committee, many nominations were coming to the committee that

concentrate on three young experts: Bradley Cramer, Thijs Vandenbroucke and Živilė Žigaitė. During the general election among the current 18 titular members of ISSS, all three candidates were approved. Many congratulations to Brad, Thijs and Živilė.

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THE ISSS AWARD: KOREN' AWARD

1. Guidelines for the ISSS Award: Koren' Award

Description: This award is intended to recognize and encourage excellence in research related to Silurian stratigraphy and paleontology by younger researchers. It will be presented every four years at the Silurian Symposium.

It is proposed that this award be formally termed the "Koren' Award" in honor of the late Dr. Tatiana Koren’ (1935-2010), former Secretary and Vice Chair of the Silurian Subcommission (as well as member of Ordovician and Devonian subcommissions) and a global expert on graptolites who made many lasting contributions to the biostratigraphy of the Silurian System (see Memorial in 2011 in *Silurian Times* (No. 18) and *Ordovician News* (No. 28)).

Selection Procedure: Recipient of this award will be based on nominations from voting (titular) members of the Silurian Subcommission overseen by a committee of three titular members. The nomination will consist of an updated CV, including list of publications relevant to Silurian stratigraphy and letter or letters of recommendation from one or two or several voting members of ISSS. Letters should emphasize the fit of the nominee for the criteria listed below.

The nominations will be reviewed by the committee on awards (presently Carl Brett, Renbin Zhan and Petr Štorch) who will prepare a slate of candidates including brief synoptic biographies that will be voted upon by all titular members. The candidate receiving the largest number of votes will receive the award.

Criteria for selection: The candidate may be chosen from among any paleontologists/stratigraphers who fit the following criteria:

A successful candidate should:

1) be 40 years of age or younger.
2) possess a graduate degree (ideally Ph.D, although candidates with masters degrees may be considered).
3) have completed at least five years of professional research (Ph.D studies included).
4) have a substantial record of publication (mostly senior authored) related to Silurian stratigraphy, paleontology, paleobiology, paleobiogeography or paleoceanography, etc. in peer-reviewed journals.
5) be actively contributing to Silurian research at the time of the award.
6) demonstrate an outstanding ability to communicate ideas verbally (as in conference talks) and in writing.
7) be supported by two or more titular members of the Silurian Subcommission.

Besides, the ISSS will avoid awarding two continuous recipients from the same country or state in 8 years.

Certificate and bonus: Each winner of the "Koren' Award" will received a formal Certificate issued by ISSS with the Chair's signature and $300US as bonus, both of which will be awarded at the closing ceremony of each Silurian Symposium every four years.

2. Report on the First ISSS Koren' Award

After the announcement asking for nominations for the "Koren' Award" in the Silurian Times 22 in late March 2015, the Nomination Committee had received two formal norminations before the deadline (i.e. the end of April 2015): Bradley Cramer from the United States of America and Emilia Jarochowska from Poland. The Committee reported this situaton to the Executives of ISSS in early May 2015, and ran a general election among the 18 Titular Members of ISSS as suggested. Before the deadline the Committee set for submitting votes (20 June, 2015), 17 valid votes had been received amongst which Emilia obtained nine votes while Brad got eight. The Executives of ISSS eventually decided the first Koren' Award of ISSS went to Emilia Jarochowska. The award was announced at the Silurian Symposium held in Quebec City on July 8, 2015. Many congratulations to Emilia for her outstanding achievements in Silurian study!

Dr. Emilia Jarochowska:

Date of birth: 27 January, 1986

Affiliation: GeoZentrum Nordbayern, University of Erlangen-Nuremberg, Loewenichstr. 28, 91054 Erlangen, Germany

Education:

2015: Ph.D., University of Erlangen-Nuremberg.
"Late Wenlock sea-level changes in carbonate ramp environments of the Baltic Basin: sequence-stratigraphic controls over carbon isotope stratigraphy and conodont turnover", supervised by Axel Munnecke
2012: M.Sc. in geology, University of Warsaw
2010: M.Sc. in biology, University of Warsaw

Awards: 2015 ISSS Koren' Award

Present position: Assistant professor

Research interests:
- Mechanisms shaping the diversity of early Paleozoic conodonts
- Sequence stratigraphy in carbonate systems and its imprints on paleoecological patterns

My current projects include integration of sequence and conodont stratigraphy in the Homerian of West Midlands, UK (cooperation with Dr. David Ray), carbon isotope stratigraphy of the S/D boundary and the Hirnantian in Uzbekistan (cooperation with Russian colleagues E.D. Mikhailova and A. Tarasenko), and conodont and early vertebrate microfauna in the middle Silurian of Gotland (with Oskar Bremer).


Emilia Jarochowska (left) is doing field work in the rain (right).

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International Geoscience Programme
Project 591 - Closing Meeting
'The Early to Mid Palaeozoic Revolution'
Ghent University

jointly with: The International Subcommission on Cambrian Stratigraphy (ISCS)
The International Subcommission on Ordovician Stratigraphy (ISOS)
The International Subcommission on Silurian Stratigraphy (ISSS)
The International Subcommission on Devonian Stratigraphy (ISDS)

Ghent, Belgium, 6-9 July 2016

Second circular & website. This second circular provides an update of our plans for the closing meeting of IGCP 591, to be held next summer at Ghent University (Ghent, Belgium), following our first announcement of the meeting earlier this year. A third circular, including a full programme, will be prepared closer to the meeting but we invite you to check our website regularly for news, registration details and programme updates: **www.IGCP591.ugent.be**

Summary schedule

12 February 2016	Registration opens
13 March 2016	Early bird registration closes
15 April 2016	Abstract submission deadline
5 July 2016	GCM modelling workshop, Dept. of Geology, UGent (included in registration)
6-9 July 2016	Closing meeting IGCP591 scientific sessions at 'het Pand', UGent
8 July 2016	Mid-meeting workshops at 'het Pand', UGent (included in registration)
10-15 July 2016	Welsh Basin (UK) Field Trip *"Revolutions that made the Palaeozoic world - Revealed in the ancient strata of Wales"* (to be booked separately)

Conference theme

A combined data-model approach to understand the early to middle Palaeozoic revolution

This multidisciplinary meeting aims at bringing together specialists from the data-community, including but not exclusively, sedimentology, physical stratigraphy, (micro)palaeontology, geochemistry, geochronology and palaeogeography with specialists from the numerical modelling community who focus on, e.g., climate, ice-sheet, geochemical, palaeo-ecological or sedimento-logical modelling. Using data-model comparison methods, we aspire to obtain a better understanding of the complex processes that shaped the Earth during the IGCP591 'time window', and, by extension, the whole Palaeozoic. As such, we will construct a synthesis of the advances made during the whole IGCP591 programme and associated projects, and help set the agenda for continued community-driven initiatives for the future.

Given that deep-time data-model comparison requires a profound understanding of the stratigraphy, this will be a joint meeting with the Cambrian, Ordovician, Silurian and Devonian commissions on stratigraphy. Break-out sessions for each of the sub-commissions' specific research and business will be organized as part of the meeting. The ISDS session will be co-sponsored by our friends of IGCP 596.

Keynote presentations

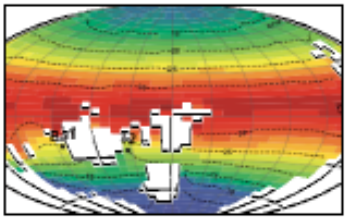
The organizers intend to achieve a dynamic discussion through a series of invited standard and key-note lectures by recognized specialists in the field, including contributions on methods still to gain firm footing in Palaeozoic deep-time. The preliminary list of keynote-speakers (and covered themes) includes:

Keynotes

Dr. Poul Emsbo (United States Geological Survey – *Geochemistry of Silurian oceans*)
Prof. Timothy Lenton (University of Exeter, UK – *Ordovician to Devonian climate modelling*)
Dr. David De Vleesschouwer (Marum/Bremen University, Germany – *Palaeozoic Astrochronology*)
Prof. Stephen Hesselbo (University of Exeter, UK – *Ocean anoxia through time*)
Prof. David Beerling (University of Sheffield, UK – to be confirmed)

Workshops

Pre-meeting workshop on 5 July 2016: GCM climate models in deep-time

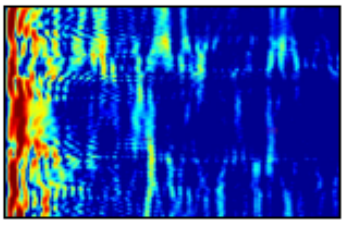


Short course / workshop on climate modelling, mainly targeted at members of the data-community and convened by Dr. Yannick Donnadieu (CNRS).

Part of IGCP 591's focus has been to document the major steps in the evolution of Phanerozoic climate, its links to biotic change, and the ways in which these climates can be tracked by fossil proxies and simulated by advanced numerical computer models. Sophisticated climate models are at the forefront of such studies, but their full potential remains to be realised in the early - mid Palaeozoic. In addition, it remains essential to evaluate the robustness of output produced by such models through comparison with palaeoclimate proxies, such as synthesised (micro)fossil data (which are especially important for deep-time applications). As part of the IGCP591's closing meeting, we are organising a short course, scheduled for the day before the talks commence (i.e., July 5th 2016), providing a practical introduction to various aspects of climate modelling, targeted at an audience of (predominantly) data-gatherers, showcasing how models work exactly, what we can and cannot do with/learn from climate models, and how data can be integrated most efficiently. With this short course, we seek to promote further integration of geological and numerical approaches, and to facilitate the development of comprehensive reconstructions of Earth's past climate. We hope to highlight the potential of further collaboration between the modelling and data communities, which we think can be an important topic for a potential successor project. We have approached climate modellers and palaeoclimatologists to give a series of synthesis papers and short-course style presentations. At present, confirmed speakers are:

Prof. Alan Haywood (University of Leeds, UK)
Dr. Yves Goddéris (CNRS, Université Toulouse III - Paul Sabatier, France)
Dr. Fanny Monteiro (University of Bristol, UK)
Dr. Didier Roche (CEA/CNRS-INSU/UVSQ, Gif-sur-Yvette, France)
(VU University Amsterdam, the Netherlands)

Mid-meeting workshop on 8 July 2016: "A Short Course on the Construction of High-precision Astronomically-calibrated Time Scales"



A mid-meeting workshop led by Prof. Stephen Meyers, University of Wisconsin, USA.

Numerical dating of the geologic record provides an essential framework for interpreting the rich history of our planet. However, as geoscientists increasingly pursue high (spatial) resolution stratigraphic analyses in deep time, the short temporal scales (<100.000 years) of the processes investigated push the limits of high-precision geochronology. This short course will examine the application of astrochronology to enhance the accuracy and precision of geologic time scales. Astrochronology uses the geologic record of climate oscillations—those ascribed to periodic changes in the Earth's orbit and rotation—to measure the passage of time from rhythmic layers in strata. The

approach is especially valuable for constraining time scales through ash-poor intervals that cannot be directly dated with radioisotopic methods. We will discuss the potential for developing a complete astronomically-tuned Phanerozoic time scale, the fundamental challenges to achieving this goal, and potential solutions to address these challenges. The short course will include a tutorial with the software "Astrochron: An R Package for Astrochronology".

Mid-meeting workshop on 8 July 2016: 'Numerical Biochronology: Sequencing Large Numbers of Palaeobiologic First- and Last-Appearance Events'.

Instructor: Prof. Peter Sadler, University of California Riverside, USA.

The workshop will review the logic of a range of computer algorithms available for correlation and seriation of biostratigraphic and chemostratigraphic events. These algorithms implement familiar ground rules from biostratigraphy to generate time lines with finer resolution than traditional biozones. Hands-on application to real Palaeozoic data sets will explore a range of options in the CONOP (CONstrained OPtimization) software, written for Windows (XP, 7, 10) 32-bit and 64-bit operating systems (or Windows emulation on Mac computers). CONOP conducts brute-force, trial-and-error searches that employ a simple physical analogy rather than esoteric mathematics. We will use it to mimic the logic of several different seriation programs. Course notes, the CONOP program and data-manager, manuals and sample datasets will be provided to all participants.

Field trip: 10-15 july 2016 **Revolutions that made the Palaeozoic world**
Revealed in the ancient strata of Wales

Leader: Prof. Mark Williams, University of Leicester, UK.

Visit the magnificent and ancient landscape of Wales, birthplace of the Cambrian, Ordovician and Silurian systems. From its volcanic origins in the late Precambrian, Wales gave birth to a sedimentary marine basin in the Cambrian Period that endured for some 100 million years. In Welsh strata is preserved the story of Earth's first complex marine ecosystems during the Cambrian substrate revolution, and the birth of a global macrozooplankton and complex planktonic ecosystems during the Great Ordovician Biodiversification Event. Here too, are preserved some of the first rivers to flow in a meandering pattern on Earth – witness to the extension and impact of a terrestrial biosphere during the Devonian, now fossilised in strata of Pembrokeshire. In the land of poetry and song, unfolds a tale of how Earth's biosphere became diverse and resilient. Of how it responded to, and survived, the great upheaval of the end Ordovician extinction.

On this field excursion we will traverse the story of the early Palaeozoic Welsh depositional basin, from its terrestrial margins, through shallow marine settings into the deep abyss of its centre, glimpsing ancient and sometimes bizarre seabed ecosystems from deep beneath the ancient sea, and understanding the history, facies and biota of perhaps the most remarkable and best studied lower Palaeozoic basin on Earth.

The landscape and geology in a few images

Left. Contorted Ordovician strata form the cliffs of the beach below the beautiful Welsh village of Llangrannog. Slipping down the palaeoslope of the ancient Welsh Basin in the Late Ordovician, these wet sediment folds signal a fall in global sea level as, 1000s of kilometres to the south, the southern polar ice sheet reached its glacial maximum.

Right. Magnificent Marloes Sands records a detailed transition from marine to terrestrial settings during the Silurian. Sir Roderick Impey Murchison visited Marloes in the 1830s during his work to establish the Silurian System.

Left. The ancient cathedral at St. David's rises above a majestic peninsula that preserves some of Wales' most ancient rocks, including strata with evidence of the Cambrian marine substrate revolution.

Right. The ancient standing stones of Pentre Ifan burial mound form part of the unique Neolithic heritage of the Prescelly Mountains in south Wales. We will stay in this area of Wales as a base for the field trip.

Venue

The conference will take place at 'het Pand', Ghent University's main conference venue, right in the historical city centre of Ghent and housed in a former medieval Dominican monastery. Ghent is an enchanting and vibrant city, which is often referred to as one of the most beautiful historic cities in

Europe. From St. Michael's bridge, literally 2 minutes away from the meeting venue, there is a breath-taking view of the skyline of Ghent with the three impressive towers of St. Nicholas' Church, the Belfry with its bell tower and St. Bavo's cathedral, which houses the world famous painting "The Adoration of the Mystic Lamb" by Jan van Eyck (1426-1432), currently being restored, but open to the public. Traces of the Middle Ages run throughout the city. The old port, with its guild halls on the Graslei and Korenlei, is merely one example of the beautiful sights this town has to offer. Not far from the Graslei arises the Castle of the Counts, once the medieval fortress of the Counts of Flanders, which will be the venue for the welcome reception. Other social activities will include a convivial evening at Ghent's famous Jazz Festival.

Travel and accommodation

Transport into Ghent is easy, quick and affordable when booked early: travel times by train from London St. Pancras to Brussels South Station are less than 2 hours (www.eurostar.com); Paris Nord - Brussels South is just over an hour (www.nmbs.be). Ghent station is a less than 30 minutes direct train ride away from Brussels South station. Many European and intercontinental airlines fly directly into Brussels Airport, which is easily reached by direct train from Ghent railway station (allow 1 hour). The city of Ghent has a good public transport network, allowing you to get to the hotels and conference venues very quickly and easily. Hotels in the historic city centre typically are within walking distance of the venues.

Registration for the meeting will not include accommodation, and conference participants are responsibe for making their own bookings. More details and suggestions to help you make your travel arrangements will become available closer to the meeting (visit our website).

Registration

Registration (online via http://www.igcp591.ugent.be) will open on February 12th 2016 and an "early bird" registration (i.e., substantially reduced fees) **deadline is set on March 13th**. Check our website (http://www.igcp591.ugent.be) for details as they become available. Fees will be c. €330 for professionals and c. €280 for students (this will cover full registration, lunches, coffee-breaks, and all social events; this will also include access to the workshops on 5 and 8 July, at no additional charge). Registration for the field trip will be limited to 25 participants as it is impossible to take a large coach to the some of the outcrops. In case of over-subscription, the first-come-first-served principle will apply, in combination with criteria that ensure priority for scientists having travelled far, requiring access to specific sites for current research, and/or a fair spread amongst participants across institutes.

Abstract submission

Abstract submission will be via e-mail and instructions for formatting will be available on our website (www.IGCP591.ugent.be) when registration opens. Deadline for submission of abstracts will be April 15th.

Organising Committee

Thijs Vandenbroucke (Ghent University, Belgium)
Bradley Cramer (University of Iowa, USA)
Anne-Christine da Silva (Université de Liège, Belgium)
Mark Williams (University of Leicester, UK)
Philippe Claeys (Vrije Universiteit Brussel)
Stephen Louwye (Ghent University, Belgium)
Yannick Donnadieu (CNRS, France)
Kurt Blom (Ghent University, Belgium)
Marc Faure (Ghent University, Belgium)
Wim Lievens (Ghent University, Belgium)

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Jacques Verniers (Ghent University, Belgium)
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PalAss Grant n°: PA-GA201509

BRIEF REPORT ON THE LATEST STUDY OF SILURIAN STRATIGRAPHY AND PALEONTOLOGY

1. Telychian graptolites from Norton Street, Rochester, New York State

by David K. Loydell (david.loydell@port.ac.uk) and Charles E. Mitchell (cem@buffalo.edu)

SOME discoveries are insufficient to warrant a full scientific paper, but significant enough that they should be shared with a wider audience. The graptolites mentioned here fall into that category and are therefore reported here on the basis that this short account may prompt someone to undertake some further work on the locality concerned.

The story commences with the discovery by CEM of a small limestone slab in the collections of the Paleontological Research Institution, Ithaca with a label indicating that it had been collected from Norton Street, Rochester. The usefulness of this locality information is reduced somewhat when the length (approx. 6km) of Norton Street is taken into account, but the most likely origin is from the west end of Norton Street in the Genesee river gorge. Unfortunately, no lithostratigraphical data (e.g. formation on bed name) were provided with the specimen.

The bedding surface of the piece of rock concerned has maximum dimensions of 11 cm by 7 cm. Its thickness varies from 5-13 mm. Numerous graptolites occur on both top and bottom surfaces and also at various levels within the slab.

The graptolite assemblage is monospecific, consisting of *Oktavites spiralis*, biozonal index for the Telychian *spiralis* Biozone and with a total stratigraphical range of base *spiralis* Biozone to middle *lapworthi* Biozone.

Very few graptolite species have been recorded from the Telychian of New York: assemblages are usually heavily dominated by *Stimulograptus clintonensis* with *Monograptus priodon* and *Retiolites* occasionally recorded. The occurrence of *St. clintonensis* together with *Pterospathodus amorphognathoides amorphognathoides* in the Williamson Shale of Tryon Park, Rochester presented what has been described as a ‘biostratigraphical enigma’ (Loydell et al. 2007) in that the stratigraphical ranges of the two species do not overlap elsewhere: *Stimulograptus clintonensis* ranges from the uppermost *turriculatus* Biozone through to the middle *griestoniensis* Biozone, with *Pt. a. amorphognathoides* having its FAD at the base of the *Cyrtograptus lapworthi* Biozone, two and a half biozones above the LAD of *St. clintonensis*. Clearly the stratigraphical ranges of one or both of these species (*St. clintonensis* and *Pt. a. amorphognathoides*) differ from what has been recorded elsewhere in the world (both are common and geographically widespread species). Thus, if the stratigraphical level of the limestone bed that yielded the *Oktavites spiralis* can be established in relation to the Williamson Shale it may help to resolve the issue: if the graptolitic limestone is above the Williamson Shale then it would appear that the FAD of *Pt. a. amorphognathoides* is earlier here than elsewhere; if it is below, then the LAD of *St. clintonensis* is later.

If you do discover this *spiralis*-bearing graptolitic layer both authors would be eager to hear from you.

Reference

Loydell, D.K., Kleffner, M.A., Mullins, G.L., Butcher, A., Matteson, D.K. and Ebert, J.R. 2007. The Williamson Shale (Silurian) of New York: a biostratigraphical enigma. *Geological Magazine*, 144, 225–234.

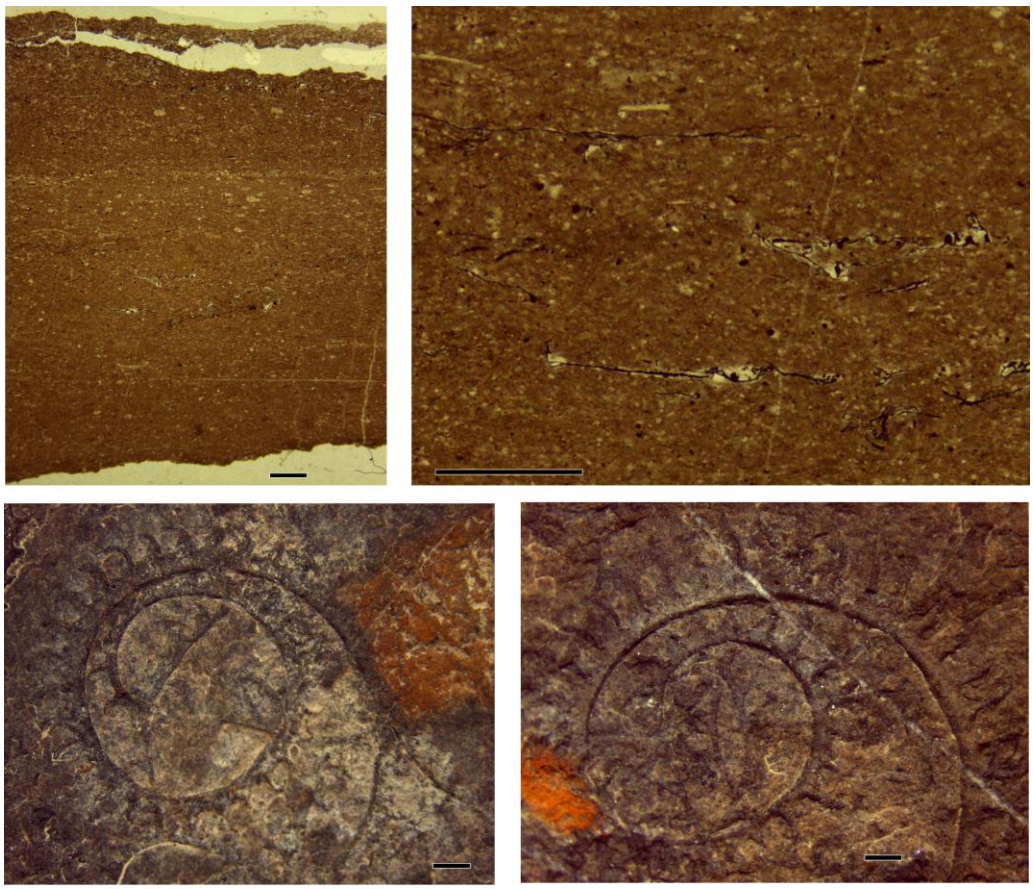

Fig. 1. Above, thin section through graptolitic limestone, Norton Street, Rochester with close-up showing graptolite rhabdosomes. Below, two of the many examples of *Oktavites spiralis* present on the bedding surface. All scale bars represent 1 mm.

SILURIAN RESEARCH 2015: NEWS FROM THE MEMBERS

(*in alphabetical order*)

Anna ANTOSHKINA (Russia): I continue to work on the Upper Ordovician-Lower Silurian successions exposed on the northern Urals (the Ilych River region) with contribution from my postgraduate student Lyuba Shmeleva. Integration sequence sedimentology with conodont species-based biostratigraphic packages has shown that the uppermost Katian Yaptikshor Formation includes a part of the Hirnantian deposits. The collected data on the upper Katian Bol'shaya Kos'yu reef revealed specific sphictozoan sponges bear a striking resemblance to the same in Ordovician reefs in China. We plan to use carbon isotopic profiles for identification the Hirnantian and Ordovician-Silurian boundaries in the northern Urals, and we are working on a sequence stratigraphic correlation of two Hirnantian sections, one from the subpolar Urals, the other from northern Urals. Together with Constance Soja, we continue our researches on the Silurian reefs and paleogeography.

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Gudvig BAARLI (USA): I am continuing taxonomic description of the very rich fauna of the orders Atrypida and Atrypidina found in the lower Llandovery of the central Oslo Region, Norway.

In the summer of 2016, we are also starting a new project on the Ordovician/Silurian faunas from strata in the bottom of the last valley incision in Hirnantian time into Silurian strata. This work will be done together with Markes Johnson and other colleagues.

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Chris BARNES (Canada): I am continuing Silurian conodont paleontology/stratigraphy /isotope geochemistry research. The main current projects include: a) Silurian paleotemperature record determined from SHRIMP oxygen isotope measurements from conodonts (with Julie Trotter (UWA), Ian Williams (ANU), Peep Männik (TUT) and Andrew Simpson (Macquarie University)); and b) Ordovician and Silurian conodont biostratigraphy and paleoecology, Canadian Arctic Islands (with Zhang (GSC), Jowett and Carson (PetroCanada)).

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Richard BATCHELOR (UK): I have not published on Silurian matters for some years but I am interested in receiving the Silurian Times regularly.

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Juan BENEDETTO (Argentina): I am working on the taxonomy and phylogeny of the Silurian brachiopods from the Precordillera basin (Cuyania terrane) of west-central Argentina. Particular interest is being devoted to the phyletic lineage starting with *Anabaia* in the early Llandovery and culminating with *Harringtonina* in the Wenlock-Pridoli, and its evolutionary relationship with the widespread Gondwanan genus *Clarkeia*. A second project deals with the end-Ordovician mass extinction, the subsequent brachiopod recovery during the early Silurian, and the emergence of the Afro-South American Realm. This study is based on the rich brachiopod faunas from the La Chilca and Los Espejos formations. Also is studying the correlation between the sea level highstand at the base of Sheinwoodian documented throughout the Precordillera Basin and the Central Andean Basin (NW Argentina, Bolivia, Peru) and the severe crisis experienced by the brachiopod faunas at that time.

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Stig Bergström (USA): My 2015 research activities on the Silurian have been quite limited--I have worked mostly in the Ordovician during the past year. Still involved in projects on the Lower Silurian in Sweden and the USA and the Ordovician/Silurian boundary world-wide using chemostratigraphy and conodont biostratigraphy. Among the 9 articles published during 2015, only one deals with a Silurian topic.

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Alain BLIECK (France): Concerning the Silurian, I had no activity in this field last year, no published papers concerned with. However, I remain interested in the SSS activities and would appreciate being kept in its mailing list.

I am presently working on a rather unknown biodiversification period on Earth, viz. the Early Devonian one, which follows the late Silurian events (paleoclimatic, biological, ecological, geobiological…). A preliminary communication has been given on the subject at the IGCP 596 meeting in Brussels, last Sept. 2015 (Blieck, 2015), where it has been called the Great Eodevonian Biodiversification Event (GEBE). A paper is being written

for a Paleobiodiversity and Paleoenvironments special issue (Springer Verlag). A more advanced version will be presented at the IGCP 591 meeting in Ghent, next July 2016.

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Carl BRETT (USA): In the past year, I continued working with several colleagues on Silurian sequence, chemo- and event stratigraphy and paleoecology of southern Laurentia. Research is divided into about four project areas.

A) Research on Silurian Sequence and Chemostratigraphy: Ohio-Kentucky-Indiana-Tennessee, New York, Pennsylvania, and Ontario, Canada. Funding by NSF and US Geological Survey.

Former UC student, James Thomka (now at University of Akron, OH) and I have continued working on the detailed sequence and cycle stratigraphy, taphonomy, paleoecology (especially of echinoderms) and paleoenvironments of the early Wenlock interval in Indiana, Kentucky, and Tennessee. Several papers were published (Thomka and Brett, 2015a, b) or are in press and Thomka has completed his PhD dissertation.

I am also continuing to work in collaboration with Frank Brunton of Ontario Geological Survey (Sudbury) on refining correlations and patterns of sequence stratigraphy and isotope stratigraphy across the border from New York State and Ohio into Ontario, Canada. Frank has produced a major compilation of subsurface data, including isotopic profiles in the Lockport Group. This demonstrates much lateral continuity of major units, but also considerable local variability in thickness and facies. We will be working through this large new dataset to consider its implications for global correlations.

Together with PhD student Matthew Vrazo, I have expanded field study of the sequence stratigraphy of upper Silurian Wills Creek and Tonoloway formations in Maryland. Working with Brad Cramer (University of Iowa), in the next couple of years, we intend to produce a synthesis on sequence and chemostratigraphy of these highest Silurian beds and to tie sequences into those in the classic Salina Group of New York State.

B) Silurian in Quebec: Patrick McLaughlin (Indiana Geological Survey) and I attended the Mid Paleozoic meeting of IGCP 591, on the Ordovician and Silurian, in Quebec City. The post-meeting field conference in Anticosti Island led by André Desrochers and Jisuo Jin was inspiring and provided a very intriguing look at the upper Katian-Telychian succession. I hope to continue research on extending correlations and evidence of bioevents from the Appalachian Basin and Cincinnati Arch into the Anticosti region. To that end, I am working with Pat and others on correlation and isotope stratigraphy of a long core section of the Katian-Llandovery interval drilled on Anticosti.

C) Volatility in the Silurian-Devonian

At a broader scale, I have started investigating the relative "volatility" of stage-level time slices in the Silurian and Devonian. New absolute dates for the stages have led to surprising and counterintuitive results. Certain intervals (e.g. the Wenlock) exhibit numerous events and sea level oscillations. In contrast, other intervals, most notably the Telychian, formerly perceived to be relatively short based on few physical and biotic events, have turned out to be quite lengthy. This suggests a genuinely bimodal distribution in the frequency of events that I term "volatility". A series of other features appear to be correlated with these two opposed phases. Most notably, the low volatility intervals appear to be times of relatively high sea level and warm climates with weakly developed large-scale depositional sequences, as opposed to well defined decimeter-scale rhythmic bedding of green and even maroon mudstone facies that may reflect precessional scale climatic oscillations; are common in offshore marine settings. The high volatility intervals appear to be associated with cooler times and show numerous well-defined, cyclothemic depositional sequences and a tendency toward gray and black (more organic rich) lithofacies. This is leading to a more general predictive model that will help to shed light on critical processes in Earth and life history.

D) Rochester Shale Revisited

Finally, I worked with two avocational paleontologists to produce an illustrated atlas of extraordinary fossils from the Silurian (Sheinwoodian) Rochester Shale in western New York with a chapter on stratigraphy and paleoecology of this extraordinary unit (Brett, 2015).

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Petr BUDIL (Czech Republic): Last and this year, I have been focusing mostly on Ordovician and Devonian, I thus can send only my personal position.

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Carole BURROW (Australia): Sue Turner (QM) and I continue to work on late Silurian vertebrate microremains from Maine, as well as the extensive collections from many localities in the Welsh Borderlands. Manuscripts on the vertebrate microremains (authored by Sue Turner, myself, Rod Williams, and Peter Tarrant) and gnathostome macroremains (authored by Mike Newman, myself, Bob Davidson, Jan den Blaauwen, and Roger Jones) of the late Silurian to Early Devonian of the Welsh Borderlands have been submitted to a special proceedings volume of the Geological Society centred on presentations given at the Brecon meeting in 2014 on the Anglo Welsh Old Red Sandstone.

Work on the late Silurian microvertebrate assemblage from the Pendock-1A borehole in western Australia continues, in collaboration with Sue Turner, Kate Trinajstic, and Gavin Young.

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Robin COCKS (UK): I spent most of the year working on a book, *Earth History and Palaeogeography* with Trond Torsvik (Oslo), which was submitted to Cambridge University Press in February 2016, and will be published later this year or early next. In it there are many new global terrane reconstructions and more local maps showing the facies throughout the Phanerozoic, including the Silurian, as well as thumbnail geological summaries of the 256 units into which we have divided the Earth. Thus I went to Oslo four times during the year. I also finished a review of Ordovician and Silurian chilidiopsoid brachiopods for the *Journal of Systematic Palaeontology* which was published electronically in November and will be in the paper volume in 2016. Other papers neared completion on the Lower Paleozoic Kazakh terranes with Leonid Popov and on the Variscan Orogeny with Wolfgang Franke and Trond Torsvik. Progress was made on the English and Welsh Llandovery brachiopod monograph for the Paleontographical Society. I attended the International Brachiopod Congress in Nanjing, China in May and whilst there continued to work with Rong Jiayu on global Llandovery (Telychian) brachiopod distributions.

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Carlo CORRADINI (Italy): The work on Silurian conodonts and biostratigraphy continues. Last year most of the researches were devoted to the Carnic Alps, where I am investigating the Silurian and Lower Devonian *Orthoceras* limestones and calcareous levels within black shales sequences, both studying new sections and updating data from classical localities. In this respect a revision of the biostratigraphy of the Silurian part of the Cellon section has been published, and a paper on the lower Lochkovian part of the section is in press (with M.G. Corriga, M. Pondrelli and H.P. Schönlaub); the revision of the biostratigraphy of the Rauchkofel Boden section, another classical section exposing rocks from Katian to Pragian, is in progress (with M.G. Corriga, A. Ferretti and H.P. Schönlaub). The taxonomic and biostratigraphic study of the conodont fauna from several sections from Ludlow to Lochkovian is in progress (with M.G. Corriga). Researches in the Carnic Alps include also geological and paleontological investigation (with L. Simonetto, M. Pondrelli, T.J. Suttner and others).

A project, coordinated by me and T.J. Suttner, with the goal to achieve a formal lithostratigraphy of the pre-Variscan sequence of the Carnic Alps is concluded with the redefinition of all the formations from Ordovician to lower Carboniferous, in cooperation with several colleagues from Italy, Austria and other countries. A volume with description of the 36 formations of the sequence (six exposing Silurian rocks) was published in the Austrian Geological Survey series.

In Sardinia I'm studying calcareous sections (with M.G. Corriga) and black shales outcrops. Samples from localities in the Spanish Pyrenees, Montagne Noire and Bohemia are in progress; a conodont fauna from the San Juan Precordillera (Argentina) is in study (with A. Mestre and S. Heredia)

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Maria CORRIGA (Italy): I am working on conodont taxonomy and biostratigraphy across the Silurian-Devonian boundary in Sardinia, the Carnic Alps and other north Gondwana regions (Pyrenees and Montagne Noire). In the Carnic Alps, I am investigating the Silurian and Lower Devonian *Orthoceras* Limestone, and several sections are in study, including Cellon, Rauchkofel Boden and other classical and new sections.

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André DESROCHERS (Canada): I am working on Upper Ordovician to Lower Silurian strata from various intracratonic basins in North America including: **i)** the Anticosti Basin in eastern Canada, **ii)** the Hudson Basin in the Canadian Arctic, and **iii)** the Ottawa Embayment in eastern Ontario. My research program focuses on high-resolution stratigraphic studies integrating carbonate sedimentology, sequence stratigraphy, biostratigraphy, and chemostratigraphy. Three current MSc projects (Alain Mauviel, Marili Vincent-Couture, and Pascale Daoust) are examining different segments of the Anticosti succession. Another MSc project (Ariane Castagner) is studying the Late Ordovician reefs exposed on Southampton Island in the Canadian Arctic; these reefal limestones have more in common with the sponge–microbial reefs that dominated worldwide in the Early Ordovician. Christopher Aucoin, a Ph.D. candidate at the University of Cincinnati, is visiting the uOttawa for one year under a Fulbright scholarship. Christopher is interested in correlating strata of the Upper Ordovician Wayneville Formation further north from the Cincinnati Region to southern Ontario. A number of collaborative projects are also in progress including: **1)** the use of $\delta^{18}O$ values of conodont apatite for testing whether significant orbital-scale climatic fluctuations controlled the development of widespread marine sedimentary cycles during the late Ordovician (with Maya Elrick and James Wheeley), **2)** the use of Li and Ca isotopes to decipher drivers of End-Ordovician glaciation (with Philip Pogge von Strandmann), **3)** the use of clumped isotope temperature data from organic material across the O/S boundary (with Ruth Kirk and Paul Dennis), and **4)** various biostratigraphic studies across the O/S boundary on Anticosti Island (chitinozoans with Aicha Achab, Esther Asselin, and Thijs Vandenbroucke; ostracods with Tonu

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Frank ETTENSOHN (USA): I continue to work with colleagues on the Silurian geology and paleontology of eastern Kentucky. At the same time, I have begun collaboration with colleagues in the China University of Geosciences (Beijing), in looking at Silurian rocks in the Tarim Basin of western China.

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Annalisa FERRETTI (Italy): My Silurian research continues to be focused on the biosedimentology and paleoecology of the Austrian Carnic Alps. I have recently coordinated a project, involving several international researchers, on the formal institution of lithostratigraphic units in the Silurian of the Carnic Alps. Five units have been recognized and introduced.

A cooperation project (with P. McLaughlin and P. Emsbo) on the study of Silurian ironstones in the US, centered on the comparison with coeval occurrences in the Carnic Alps, is going on.

The session "The contribution of fossils to chronostratigraphy, 150 years after Albert Oppel" (with M. Balini, S. Finney and S. Monechi) has been recently held at the 2nd International Congress on Stratigraphy-STRATI 2015 (Graz, Austria). The 150th anniversary of the death of A. Oppel has provided the opportunity to celebrate this outstanding stratigrapher with a session dedicated on fossils in the modern chronostratigraphy. A thematic set of papers arising from the STRATI-2015 Symposium will follow as a Special Issue to be published in *Lethaia*.

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Mansoureh GHOBADI POUR (Iran): My current research activities are on various aspects of taxonomy, biogeography and paleoecology of the Silurian to Devonian faunas from central Iran, Alborz and Kopet-Dagh regions with a special attention to trilobites and brachiopods. I have got also significant new collections of silicified ostracods and bryozoans from the Aeronian of the Tabas Region, which are currently under study in cooperation with Caroline Buttler, Mark Williams and Leonid Popov. There is also a good progress in the study of the trilobites and brachiopods from the Silurian – Devonian boundary beds of the West Balkhash Region of Kazakhstan, which I am carrying out in cooperation with Robert Owens, Leonid Popov and Elena Vinogradova.

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Luke HAUSER (UK): I am currently writing up my thesis on "The palaeontology and sedimentology of the Downton Bone Bed". As such this has taken up most of my time, however at the end of last year I did publish a method paper in the *Journal of Micropalaeontology* (full reference below).

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Kathleen HISTON (Italy): My current research forms part of a study of sea-level changes, oceanic cycles and biotic response in the Ordovician/Silurian of the Carnic Alps and other localities. It is focused on a systematic, taphonomic, paleoecologic and paleobiogeographic study of Silurian cephalopods with a view to greater precision in nautiloid biostratigraphy, establishment of nautiloid biozones and defining the migrational

pathways of pelagic faunas as a tool for timing of open seaways and microterrane position along the North Gondwana margin.

Research in collaboration with Laura Gaggero (Genoa, Italy) and Annalisa Ferretti (Modena, Italy) on radiometric dating of Ordovician/Silurian K-bentonite levels from the Carnic Alps has been completed and submitted for publication.

I am co-convener of a symposium "Past global climate change in the Himalaya and future implications" with V. Tewari, S. Ghatak and J.Jaiswal under the Theme Climate Change Studies at the upcoming 35th IGC in Capetown. The symposium is also open to presentations on global pre-Mesozoic climate change studies.

As part of my activities as co-leader of IGCP Project 591 during 2015, I co-edited with Živilė Žigaitė part 2 of the IGCP 591 Special Issue of the *Estonian Journal of Earth Sciences* which was issued in March 2015 (Issue 1, vol. 64 http://www.kirj.ee/earthsciences). This second thematic set of 22 papers resulted from presentations given at the 4th annual IGCP 591 symposium held in Tartu, Estonia in June 2014. Part 1 of the Special Issue was published in December 2014 with 23 papers.

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David HOLLOWAY (Australia): I continue to work on trilobites, mainly from the Silurian and Lower Devonian. A manuscript (jointly with Phil Lane, Keele University, UK) on diverse illaenids, bumastids and scutelluids that dominate the trilobite fauna of the late Llandovery Tomcat Creek limestone in the Broken River region of north Queensland was completed during 2015 and has been accepted for publication in *Journal of Paleontology*. Work currently in progress includes study of Early Devonian scutelluids from central Victoria, Australia.

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Emilia JAROCHOWSKA (Poland): My current projects include integration of sequence and conodont stratigraphy in the Homerian of West Midlands, UK (cooperation with Dr. David Ray), carbon isotope stratigraphy of the S/D boundary and the Hirnantian in Uzbekistan (cooperation with Russian colleagues E.D. Mikhailova and A. Tarasenko), and conodont and early vertebrate microfauna in the middle Silurian of Gotland (with Oskar Bremer).

Thanks to the funding from the Synthesys program I catalogued nearly all of L. Jeppsson's conodont collection from Gotland. I am now struggling to document the

position of each sample in order to make the dataset available for the whole community. Based on it, I am trying to quantify facies and sequence-stratigraphic controls on conodont diversity. I am also trying to collect this data on a global scale and have officially become the taxonomic curator of Early Paleozoic conodonts in the Paleobiology Database, although the compilation (1) only just started and (2) is under embargo for the needs of my own analyses and will be made available to the public in 2017.

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Jisuo JIN (Canada): Together with two graduate students, I am currently working on the origin and diversification of pentameride brachiopods (the "signature" shelly benthos for the early Silurian) after the Late Ordovician mass extinction. As a joint project with the Ontario Geological Survey (Frank Brunton), we are also carrying out a project on the Silurian-Devonian boundary interval carbonate stratigraphy and depositional systems of the northeastern Michigan Basin

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Markes JOHNSON (USA): I continue to work with Gudveig Baarli on her project regarding the Ordovician-Silurian transition in the Oslo Region, Norway. Related to our previous work on mid-continental USA paleo-valleys eroded in the Ordovician and subsequently filled-in during the Silurian, we are looking at similar patterns in southern Norway.

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Dimitri KALJO (Estonia): I am continuing studies on the Ordovician and Silurian bio- and chemostratigraphy of Baltica as a part time emeritus member at our institute and as the editor-in-chief of the *Estonian Journal of Earth Sciences*. The second part of a special issue of this journal devoted to IGCP 591 annual meeting in Estonia in 2014 was published as No 1, 2015 including 21 short papers and a preface by Guest Editors Kathleen Histon and Živilė Žigaitė. I am glad to acknowledge their great contribution into the publication.

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Anna KOZŁOWSKA (Poland): I have been continuing my research on retiolitid graptolites from Poland and Arctic Canada. I am interested in retiolitid morphology, relationships and evolution. Recently I worked, together with colleagues, on the simplest retiolitid (Graptolithina) *Plectodinemagraptus gracilis* from the Ludlow of Poland, a unique form *Virgellograptus*, described the early evolutionary history of the *Gothograptus* lineage and the first occurrence of *Prolinograptus packhami* in Poland.

Together with Alf Lenz and Mike Melchin, I have continued a project on Aeronian and early Telychian retiolitid graptolites from Arctic Canada. Work continues with Denis Bates on the retiolitid genus *Paraplectograptus.*

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LI Qijian (China): I am working on Ordovician reefs and hypercalcified sponges (e.g. calathids, stromatoporoids and sphinctozoans). In 2015, I finished my Ph.D thesis on the Ordovician radiation in reef ecosystems at the University of Erlangen-Nürnberg. I have just returned to China, and worked at the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences.

In the year 2016, complete taxonomic studies of the calathids from Tarim and South China will be carried out. With the quantitative data collected from the field, further investigation of the late Katian reef from southeast China will be conducted. I am also involved into investigation of the Silurian reefs of South China in cooperation with Dr. Emilia Jarochowska and Prof. Axel Munnecke.

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LIANG Yan (China): I am working on Ordovician chitinozoans. In the first half of 2015, I was concentrating on my PhD thesis which was focused on the Early and Middle Ordovician chitinozoans of South China and obtained my doctoral degree in July. Now, I am working as a research assistant at the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences. After my graduation, I was continuing my research on the Early and Middle Ordovician chitinozoans and trying to reveal the biodiversity pattern and to establish the chitinozoan biostratigraphy during this period in South China. This year, two papers have already been officially published together with my colleagues and three manuscripts have been submitted, all of which are based on the work of my PhD thesis. Also, I attended some relevant symposiums and conferences last year which helped me a lot.

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Steve LODUCA (USA): During the past year, as in the year before that, I was mainly focusing on Cambrian projects (including a trip to Guizhou) and therefore have no new Silurian publications to list for this issue of the Silurian Times. For my general description of activities, please use the same description from the previous Silurian Times, if possible. Currently, I have several Silurian projects underway, so I hope to have some nice additions for the next issue of ST.

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David LOYDELL (UK): I have finally completed the work on the El Pintado section and this was published towards the end of 2015 (see list of publications, herein). All specimens, both figured and unfigured are now back in Madrid. Focus will now shift to the many projects put on hold whilst completing this mammoth work.

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Jörg MALETZ (Germany): I am working on a number of projects, including the 'Graptolite Treatise Project' for which two chapters have been published in 2014 and 2015 and another three have been submitted to the Treatise editors in 2015. The work on a book on Graptolites for the 'Topics on Palaeobiology' Series (Ed. Michael J. Benton) is finished

and the book is in production now. My work on Silurian topics is limited at the moment, as I was mostly concentrating on Cambrian and Ordovician successions during the last two years. However, I am working on the biostratigraphy of a number of drillcores with Silurian graptolites from Dalarna, Sweden.

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Peep MÄNNIK (Estonia): I am actively working on evolution, taxonomy and paleoecology of conodonts, conodont-based high-resolution stratigraphy, bioevents and paleogeography. I am also interested in sequence stratigraphy, paleoclimatology and evolution of sedimentary basins. Joint studies together with colleagues from Estonia, Germany, Iran, Russia, Sweden, UK and USA on evolution and high-resolution stratigraphy of the Early Paleozoic faunas and sedimentary basins on different paleocontinents are going on. Conodont-based paleoclimatological studies (Upper Ordovician–Silurian) are in progress.

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Tiiu MÄRSS (Estonia): 2015 was the pivotal year for the Silurian fish studies in Estonia. For some years already the whole Estonian science has been strongly under-financed and many grant applications have been rejected year after year. The same also applies to the studies of fossil fish. Consequently, starting from November 2015 I am working as an ichthyologist in the Estonian Marine Institute, University of Tartu. As I still love my Silurian fishes, I will continue my research in paleoichthyology as a freelancer from my own time.

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****

Sandy MCCRACKEN (Canada): I continue to work on Middle to Upper Ordovician, Silurian and Devonian and conodonts from various locations in Canada. I am also concentrating on good collections from Hudson Bay and Moose River basins, Ontario and Manitoba. It has been a busy year finding a replacement for the conodont/foram lab technician who retired in 2014, getting a new conodont Post-Doc (Sofie Gouwy) settled (and a new Post-Doc in forams, Lisa Neville), and continuing management duties as leader of GSC's PaleoLabs.

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Michael MELCHIN (Canada): I am currently working on several projects related to graptolite biostratigraphy and biodiversity, as well as chemostratigraphy through the Late Ordovician and early Silurian, particularly in North America, Europe, and China. I am collaborating with Charles Mitchell, David Sheets, Junxuan Fan and others on quantitative stratigraphic global correlation of Late Ordovician–early Silurian strata, including GSSPs. I am also collaborating with Petr Štorch, Junxuan Fan, Xu Chen, Jan Zalasiewicz, Thijs Vandenbroucke and others on the study of potential GSSP candidate sections for the base of the Aeronian Stage in Bohemia, Wales and China, and with Junxuan Fan and Xu Chen on a GSSP candidate section for the base of the Telychian in China. I am working on a project with Dan Goldman, Chuck Mitchell, Junxuan Fan and others on quantitative graptolite biogeography. I am also working in several projects related to morphologic and phylogenetic analyses of early Silurian graptolites.

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Tatiana MODZALEVSKAYA (Russia): My colleagues and I continue to work on Silurian-Devonian brachiopods from eastern central Pamir. It will be submitted for publication to *East Asian Journal of Earth Sciences*.

I am actively working on Upper Ordovician and Silurian brachiopods from Kotel'ny Island (Novosibirsk Islands, Arctic Russia) especially on their taxonomy and biostratigraphy.

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Axel MUNNECKE (Germany): I am currently working on Ordovician and Silurian carbonate microfacies and chemostratigraphy in different areas, and I am especially interested in the biological response(s) to the pronounced climatic changes that took place during this time interval. Furthermore, I am organising an annual international course on carbonate microfacies ("Flügel Course") in Erlangen (Germany) which includes a lot of Paleozoic examples. If somebody is interested please drop me an Email as soon as

possible (the course is usually booked out months in advance). Informations can be found at: www.gzn.fau.de/en/palaeontology/events/fluegel-course/ or on facebook at: https://www.facebook.com/fluegelkurs/

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Keith NICHOLLS (UK): I have moved into writing up stage of my thesis involving formal taxonomic description of five years worth of collecting trace fossil data. Had a very fruitful visit in the Autumn 2015 to Oslofjord to see the Ordovician/Silurian boundary sections there. I am also in the process of writing up two abstract submissions for IGCP 591 in Ghent. Involved with moves toward establishing a GeoDiversity Charter for Wales. All in all a very busy year gone, and the prospect of another ahead.

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Arne NIELSEN (Denmark): I am mostly working on the Cambrian and Ordovician but on and off I also work on the Silurian on the island of Bornholm, eastern Denmark. A couple of drill cores have been obtained through the Silurian onshore Bornholm which complete and adjust the stratigraphy developed for the island by Bjerreskov (1975). Also, a petrophysical log stratigraphy is about to be published for the lower part of the Silurian in southernmost Scandinavia (with Niels Schovsbo, Geological Survey of Denmark and Greenland), and together with Emma Hammerlund, now Lunds University, Sweden, a chemostratigraphy for the lower part of the Silurian on Bornholm, based e.g. on isotopes, is in preparation.

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Godfrey NOWLAN (Canada): I have no new research to report for 2015, but I retain an interest in Silurian biostratigraphy, especially that based on conodonts.

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Ian PERCIVAL (Australia): I continue collaboration with Des Strusz to complete description of Silurian brachiopods from southern New South Wales. A preliminary assessment of this fauna was published as an extended abstract for the 7th International

Brachiopod Congress held in Nanjing in 2015. Other work this past year on research extending into the Silurian has largely involved participation in projects led by Guangxu Wang (Nanjing) to document latest Hirnantian to earliest Rhuddanian coral-dominated faunas in carbonate rocks straddling the Ordovician-Silurian boundary in South China.

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Vincent PERRIER (UK): This year I have changed my position, and published several papers together with my colleagues on Silurian paleontology and stratigraphy (see the reference list).

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Teresa PODHALAŃSKA (Poland): I have nothing new to report for the year 2015, but I am interested in being kept informed on the Silurian community.

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Leonid POPOV (UK): I continue to work on general aspects of the Silurian brachiopod faunas focusing on taxonomy, biostratgraphy and biogeography. There is a good progress in the study of the Llandovery (Aeronian) faunas of Iranian Kopet-Dagh and Wenlock to Ludlow brachiopod faunas of the Derenjal Mountains (central Iran).This job is carried out in cooperation with Mansoureh Ghobadi Pour and Vachik Hairapetian. The manuscript may be ready for submission by the end of the year. Two another ongoing projects include revision of the rich Wenlock to Pridoli brachiopod faunas from Turkestan and Nuratau Ranges of Uzbekistan and Tajikistan (in cooperation with Irina Kim) and Llandovery brachiopod faunas of Chingiz Range (in cooperation with Tatiana Modzalevskaya).

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David RAY (UK): My research activities over the past year have focused upon the Wenlock Series of the Midland Platform (England). Collaboration with Helen Hughes has resulted in the establishment of a high-resolution carbon isotope and sequence stratigraphic record for the Sheinwoodian and lower Homerian stages (Hughes and Ray, 2016). In addition details of the carbon isotope and facies variability at the Wenlock-Ludlow boundary have been assessed by collaboration with John Blain and James Wheeley (Blain *et al.*, in press). Further projects focusing on details of the Mulde carbon isotope excursion are also ongoing and via collaboration with Emilia Jarochowska and the University of Birmingham. These projects aim to further refine the regional and global correlation of the late Homerian.

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Claudia RUBINSTEIN (Argentina): I am currently leading two research projects dealing with marine and terrestrial palynomorphs (marine phytoplankton, chitinozoans, cryptospores and trilete spores) from the Lower-Middle Paleozoic of western Argentina, mainly focused on high resolution biostratigraphy, diversity trends, paleobiogeography, paleoenvironments and paleoclimates. Susana de la Puente (expert of Ordovician and Silurian chitinozoans), Victoria Garcá Muro (Silurian and Devonian acritarchs and miospores) and Cristian Solano Rodriguez (Ordovician acritarchs and miospores) form part of our Paleozoic Palynology Team. I also contribute to the Argentinian stratigraphic lexicon. I am in charge of the Silurian (http://www.geologica.org.ar/archivos_usuarios /LEXICO-ESTRATIGRAFICO-SILURICO-C.V.-Rubinstein-enero-2014.pdf) and Devonian (http://www.geologica.org.ar/archivos_usuarios/LEXICO-ESTRATIGRAFICO -DEVONICO-C.V.-Rubinstein-enero-2014.pdf) volumes.

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Valeri SACHANSKI (Bulgaria): I am working on Ordovician–Devonian stratigraphy of Bulgaria and Turkey and especially on Silurian–Lower Devonian graptolite biostratigraphy.

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Paul SELDEN (USA): I have mainly been working on Mesozoic and Cambrian arthropods, hence missing the mid-Paleozoic (see my website for access to publications: selden.net). However, these general articles, and one from the early Devonian, may be of interest to Silurian workers.

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****

Lawrence SHERWIN (Australia): I finished contract employment with the Geological Survey of New South Wales at the beginning of 2015 and am now officially retired, though I remain affiliated with the GSNSW as an honorary research associate. Work on early Silurian graptolites from Bungonia and Parkes is proceeding slowly. I was also involved in reviewing the Siluro-Devonian stratigraphy of central New South Wales as part of a study on dating volcanic units, intrusives, deformation and associated mineralisation. This work is now being edited and should be published in 2016.

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Constance SOJA (USA): I continue to work on Silurian-Devonian paleontology and sedimentology in Alaska's Alexander terrane. Specifically, I am interested in understanding the influence of Caledonide orogenesis on Silurian-Devonian evolutionary ecology in the terrane. Multi-disciplinary evidence confirms that the Alexander terrane was located in the N. Atlantic-Caledonide region during the Silurian-Devonian and was affected by Caledonide tectonics, leading to the deposition of the oldest and only known Paleozoic lake deposits in Alaska (paper *in press*). Anna Antoshkina and I are also

preparing an updated assessment of the Alexander terrane's paleobiogeography based on a comprehensive database of fossil taxa (microbes-metazoans).

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Petr ŠTORCH (Czech Republic): My major current effort is on the re-evaluation and subsequent replacement of the Aeronian GSSP. Further progress in the multi-disciplinary study of the Hlásná Třebaň section – a candidate for GSSP of the Aeronian Stage – was presented at ISSS Workshop, Prague 2015. A monograph on Rhuddanian-Aeronian boundary graptolites from the Prague Synform (Czech Republic) has been published (Štorch, 2015) and a multi-proxy study of the Hlásná Třebaň section will be submitted for print in collaboration with Š. Manda, J. Frýda, Z. Tasáryová, L. Chadimová, A. Butcher and M.J. Melchin. Mike Melchin and I are working on systematic revision of zonal index graptolite *Demirastrites triangulatus* and related early Aeronian species. Also, a continuous Homerian succession exposed in Kosov Quarry has been studied bed by bed with respect to ongoing revision of the Homerian GSSP. Systematic bed-by-bed study of a continous Ludlow succession, exposed by a series of trenches in graptolite-dominated shaly facies of the western part of the Prague Synform, has been completed in collaboration with Š. Manda, J. Frýda, Z. Tasáryová and L. Slavík. The Ludfordian and upper Gorstian part has been already published by Manda *et al*. (2012) and Štorch *et al*. (2014) respectively. High-resolution stratigraphy of the Wenlock-Ludlow boundary interval is in print in *Canadian Journal of Earth Sciences* (Štorch, Manda, Slavík and Tasáryová) and a paper covering lower Gorstian strata is in preparation.

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Desmond STRUSZ (Australia): I have been working with Ian Percival of the New South Wales Geological Survey on the hitherto unpublished Silurian brachiopod fauna of the Delegate River Mudstone at Quidong, southern New South Wales. Most of the taxa have already been identified, and their descriptions drafted. A preliminary report on the results of this project, particularly regarding paleoecology and paleobiogeography, was presented at the 7th International Brachiopod Congress in Nanjing, May 22-25, 2015. A paper describing the fauna is in the final stages of preparation, with submission intended for the first half of 2016. This work is a contribution to IGCP 591 'The Early to Middle Paleozoic Revolution'. The next project is to work up for publication the fauna of similar age from the Cappanana Formation near Bredbo, south of Canberra, using material in the

collections of Geoscience Australia.

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TANG Peng (China): In 2015, I was working on chitinozoans of Late Ordovician and Silurian age in China. I have worked on two GSSP candidate sections, i.e. the base of the Wenlock Series in Ziyang area, southern Shaanxi Province, and the base of the Telychian Stage in Shennongjia area, northwestern Hubei Province. Some conodonts together with graptolites, chitinozoans, melanosclerites and some other fossils have been discovered in the Telychian-Sheinwoodian transitional interval in the Wuxiahe Formation, southern Shaanxi Province. Liang Yan, who was doing PhD with Zhan Renbin and me, finished her thesis "Early-Middle Ordovician Chitinozoans of the Upper Yangtze Region ----Systematics, Biostratigraphy and Biodiversity". In addition, I have completed a comprehensive report "the Triassic Research of the Junggar Basin" for PetroChina Xinjiang Company.

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Alain THOMAS (UK): I have nothing significant to report for the year of 2015, but things will be better this year and I hope to be updated with various information of our Silurian community.

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Oive TINN (Estonia): I am currently working on fossils from the Kalana lagerstätte, Estonia.

Oive Tinn

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Petra TONAROVÁ (Czech Republic): I continued in research focused mainly on scolecodonts around the Ordovician/Silurian boundary. Together with O. Hints and A. Desrochers, we studied the polychaete assemblage in the Anticosti Island. Another joint research (with O. Hints and M.E. Eriksson) was focused on scolecodonts from Estonia (Baltica) and in the ongoing research we are including data from the Prague Basin (peri-Gondwana). Moreover, we made also a progress in long-neglected research on Devonian scolecodonts (specifically from the Eifel Mountains and Prague Basin).

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Thijs VANDENBROUCKE (Belgium): I remain interested in reconstructing the Silurian paleoclimate and paleoenvironment. In October 2015, I have changed jobs and moved back to Ghent University in Belgium for a lecturer position in stratigraphy and paleontology.

My ongoing projects in the Silurian include an all-but-written-up chitinozoan biostratigraphy of the Rheidol Gorge section in Wales, similar work on other sections in the Welsh Basin (e.g., the type Llandovery, with Jeremy Davies, BGS, and co-workers), integrated stratigraphic work in the midcontinent and eastern USA (with Patrick McLaughlin, Indiana Geological Survey, Poul Emsbo, USGS and Brad Cramer, Iowa University) and on Gotland (with Emilia Jarochowska and Axel Munnecke, Erlangen University, Germany). With an international team coordinated by Mark Williams (University of Leicester, UK) and funded by the Leverhulme Trust, we are currently re-investigating the Early Paleozoic strata of Japan.

With Mark Williams, I am also co-supervising MSc student Richard Howard (University of Leicester, UK), who is working on a revision of the chitinozoan stratigraphy of the type Wenlock area. This spring, Julie De Weirdt will be starting her PhD research project in Ghent, focussing on Upper Ordovician – lower Silurian chitinozoans from the US. I also continue to co-supervise Matthias Sinnesael, who has recently started a PhD project with Philippe Claeys at the VUB (Belgium) on astronomical forcing during the Late Ordovician, but who is also interested in the Silurian.

I also remain active as one of the coordinators of the IGCP 591 project. All information can be found on our website www.igcp591.org. The project's closing meeting will be in Ghent this year (6-9 July + workshop on 5 July & field trip from 10 to 15 July), jointly with the Silurian and other subcommissions on stratigraphy. Registration is now open. See elsewhere in this newsletter for the formal announcement and circular. All information is on http://www.igcp591.ugent.be and I am looking forward to welcoming many of you there.

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Jacques VERNIERS (Belgium): The academic year 2014-2015 was the last year where my major occupation was in education and department administration as in previous years. After retiring in October 2015, I had the opportunity to keep part time an office at the Ghent University, with some teaching and continuing mainly chitinozoan research of the ongoing projects.

In 2014 in Padova I presented some new Telychian and Sheinwoodian chitinozoans from Kentucky and Ohio, USA samples in 2011, with Brad Cramer, Carl Brett and Mark Kleffner. Also in 2014 together with Thijs Vandenbroucke we supervised the Master thesis of Thomas Steeman, on the chitinozoan and δ13Ccarb biochemostratigraphy of the Homerian and Gorstian in Wales (two publications published. We were very happy to see the successful defence in September 2014 of the PhD thesis of Jan Mortier with the title "The evolution of the Upper Ordovician to Silurian basin in the Condroz Inlier and the Brabant Massif from a litho and biostratigraphical point of view". It contained more than 26 plates with chitinozoans, and many detailed descriptions of the outcrops.).

In 2015, Thijs Vandenbroucke and I supervised the Master thesis of Lander Soens on chitinozoans and carbon isotopes of Homerian strata in a borehole from Poland. Jan Mortier and I presented in 2015 the results of his PhD at two conferences (the CIMP meeting in Bergen, Norway September 2015 and also the International Geologica Belgica Meeting in Mons, Belgium January 2016). In Bergen, we also presented the study of Steeman *et al*. H. Sinha and I presented there the new findings of chitinozoans in the Indian Himalayas from a section spanning the Ordovician-Silurian boundary.

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Olev VINN (Estonia): I am working on the paleontology of problematic calcareous tubeworms from the Paleozoic (e.g. cornulitids, tentaculitids, microconchids etc.) and evolution of tubeworm biomineralization. I am also working on the evolution of symbiosis, predation, bioerosion and biofouling in the Silurian of Baltica and beyond. My current research interests include trace fossils of the Silurian of Estonia.

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WANG Guangxu (China): I continue to work on carbonates and corals across the Ordovician-Silurian transition in South China, where a complete coral sequence has been recognized in recent years. Some of these results have already been published or accepted. I am also working on early corals of early Late Ordovician age in South China.

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WANG Jian (China): I am working in Xi'an Center of Geological Survey, China Geological Survey and interested in Silurian paleontology and stratigraphy in the Northwest China. Recently I am focusing on the Silurian graptolites and sections, particularly the potential GSSP candidate section for the base of Wenlock in Ziyang area, shouthern Shaanxi Province. Some preliminary results on the graptolites and biostratigraphy of that section have already been published, and more multidisciplinary investigations are being conducted in conjuntion with colleagues from the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences.

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WANG Wenhui (China): Most of my research activities in 2015 have been involved in Ordovician-Silurian boundary projects. One paper was recently published about the earliest Silurian graptolites from a formation in Tarim which was uncertainly considered to represent the early Silurian. Another study, on the early Tremadocian '*Dictyonema Shale*' in Belgium, contributed to the regional biostratigraphy. This year, I am presently conducting a study on the graptolitic biostratigraphy of early Silurian black shales from the Yangtze Platform in South China with Dr. Chen Xu. Previous studies have proved that the intervals with higher quality of reservoirs are corresponding to certain graptolite biozonations. Study on graptolitic biostratigraphy could help mark the favorable lithologic target zones for oil-gas exploration. Graptolites from the objective unit, the Lungmachi Formation, will be studied systematically.

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WANG Xiaofeng (China): In 2015, most of my time is spent on studies of the Ordovician paleogeography of South China and Cambrian–Ordovician boundary together with Svend Stouge, Jörg Maletz, Wang Chuanshang and Yan Chunpo. I had also spent a little time on the geological ecological protection of the Yangtze Gorges area. Collaborations with Chen Xiaohong and Wang Chuanshang are being conducted on the Silurian graptolites and chitinozoans because both of them discovered last year a new graptolite-rich section of Rhuddanian to early Telychian age in the Shennongjia District, northwestern Hubei Province, central China.

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WANG Yi (China): In 2015, I focused in two Silurian projects. The first (with Tang Peng, Jiang Qing and other colleagues) concerns the early evolution of land plants (including macro- and micro-fossils) in South China and Tarim northwest China. Another project (with Rong Jiayu, Huang Bing and others) is concentrating on the correlation of strata near the Middle Paleozoic boundary in South China (i.e., the various contacts between the Silurian and its overlying rocks at different localities), and their implications for the tectonic evolution of South China paleoplate.

This year, together with my colleagues in NIGPAS and abroad, I will mainly concentrate on the study of the correlation between Silurian rocks in China and the early evolution of land plants.

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Anthony WRIGHT (Australia): I am working on Silurian and Devonian corals, with emphasis right now on operculate corals.

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ZHAN Renbin (China): I continue my work on Silurian stratigraphy and paleontology in 2015 together with my colleagues in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (NIGPAS). We have found a continuous carbonate sequence across the Ordovician/Silurian boundary in South China for the first time, and documented a complete succession of coral faunas before, within (two episodes) and after the end-Ordovician mass extinction. We also found a new occurrence of the famous brachiopod fauna, the *Cathaysiorthis* Fauna in Xichuan, southwestern Henan Province, central China, where paleogeographically belongs to the northern margin of the Yangtze Platform during the Early Paleozoic. In May 2015, as a co-chair, Zhan Renbin also organized the 7th International Brachiopod Congress in Nanjing which has nearly 60 participents from outside China: three-day indoor meeting plus three one-week post-conference field excursions (optional but just one).

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ZHAO Wenjin (China): In 2015, I was working on the Siluro-Devonian vertebrate paleontology, and relative stratigraphy, paleogeography, and paleo-environmental changes. The main achievements this year can be represented by the discovery of two jawless fishes collected from Yunnan, the definition of Silurian/Devonian Boundary at the Changwantang Section, Guangxi Province, China based on the geochemical and paleontological evidence, and the review on Silurian fishes from Yunnan, China and related biostratigraphy.

In addition, I went to Melbourne (Australia) to attend the 13th International Symposium on Early Vertebrates/Lower Vertebrates held between 3 and 7 August 2015, and gave a talk "A new species of *Siyingia* and discussion on spatial and temporal distribution of the polybranchiaspiforms". I conducted the field works both in Hunan and Yunnan in South China in August and October 2015 respectively, supported by the Special Grant for Fossil Excavation and Preparation of the Chinese Academy of Sciences, the Major Basic Research Projects of China and the National Natural Science Foundation of China. Some new important and interesting fossil fishes have been found and collected during my excursions, and we made some new progress on the Silurian stratigraphic subdivision and correlation in South China.

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RECENT PUBLICATIONS ON THE SILURIAN RESEARCH

[Note that a few publications are of 2014 or even before that were not included in previous Silurian Times, and some papers are dealing with Ordovician topics by members of ISSS.]

Adomat, F., Munnecke, A. and Kido, E. *in press*. Mass occurrence of the large solitary rugose coral Phaulactis angusta at the boundary Lower/Upper Visby Formation, Silurian, Gotland: Palaeoecology and depositional implications. *GFF*.

Amberg, C.E.A., Collart, T., Salenbien, W., Egger, L.M., Munnecke, A., Nielsen, A.T., Monnet, C., Hammer, Ø. and Vandenbroucke, T.R.A. 2016. The nature of Ordovician limestone-marl alternations in the Oslo-Asker District (Norway): witnesses of primary glacio-eustasy or diagenetic rhythms? *Scientific Reports*, 6 (13 pages).

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2. Brief introduction of new Silurian workers

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Supervisors: ZHAN Renbin and TANG Peng

Present position: Research assistant at NIGPAS

Research interests: Systematics, paleogeography, biostratigraphy and biodiversity of Ordovician and Silurian chitinozoans

Christopher STOCKER

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Education:

1st class MGeol in Geology with Palaeobiology from the University of Leicester. Currently studying towards a PhD at the University of Leicester entitled: The palaeobiogeographical significance of the Silurian trilobite faunas of Japan. My supervisors are Mark Williams and Jan Zalasiewicz of the University of Leicester (external supervisors are Derek SIVETER and Phil LANE of Oxford University Museum of Natural History and Keele University respectively).

Present position: Leverhulme Project Administrator, Assembling the early Palaeozoic terranes of Japan, Department of Geology, University of Leicester.

Research interests: The project I am working on aims to enhance palaeogeographical understanding of Japan during the early and mid Palaeozoic. I am carrying out careful taxonomic re-examination of Japanese Silurian and Devonian trilobite collections together with Derek Siveter (Oxford) and Phil Lane (Keele). This is part of a larger Leverhulme-funded project that is collectively examining trilobites, ostracods and palynomorphs from the South Kitakami, Hida-Gaien and Kurosegawa terranes of Japan.

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