International Commission on Stratigraphy

SUBCOMMISSION ON CRETACEOUS STRATIGRAPHY

ANNUAL REPORT **2011**

1. TITLE OF CONSTITUENT BODY and NAME OF REPORTER

International Subcommission on Cretaceous Stratigraphy (SCS)

SUBMITTED BY
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2. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

- *To facilitate international communication in all aspects of Cretaceous stratigraphy and correlation*
- *To establish a standard global stratigraphic subdivision and nomenclature for the Cretaceous, as part of the ICS standard global stratigraphic scale;*
- *To produce a stratigraphic table displaying agreed subdivision to substage level and intervals of disagreement, marking boundaries that are defined by a GSSP.*

3. ORGANIZATION

SCS is a Subcommission of the International Commission on Stratigraphy.

Membership: Chair: Prof. Isabella Premoli Silva, Italy
Vice Chair: Dr. Irek Walaszczyk, Poland
Secretary: Dr. Silvia Gardin, France

In addition, there are 16 Voting Members of the Subcommission, from all the continents. Over 130 Cretaceous scientists from all over the world and in many different disciplines belong to one or more of the 9 Stage Working Groups of the SCS still active, or to the Kilian Group. All WG members are treated as Corresponding Members of the Subcommission. Effectively, anyone with interest and expertise that can contribute to our objectives is welcome to do so. ***The great bulk of the Subcommission's work is carried out by these Working Groups***.

3a. Officers for 2008-2012:

Chair:	Prof. Isabella Premoli Silva (Milan, Italy)
Vice-Chair:	Dr. Irek Walaszczyk (Warsaw, Poland)
Secretary:	Dr. Silvia Gardin (Paris, France)

Thanks to Silvia Gardin, the WEB site of the Cretaceous Subcommission is now active at < http://www2.mnhn.fr/hdt203/info/iscs.php*> and can be reached also through the ICS web site*.

4. INTERFACES WITH OTHER INTERNATIONAL PROJECTS

The Subcommission has liaised with successive meetings of the *International Cretaceous Symposium*, which until 2004 have been promoted by the German *Subkommission für Kreide-Stratigraphie*. The SCS has now taken over the responsability for selection of future venues, though the successful applicants will organize individual congresses. At the *8th International Symposium on Cretaceous System*, held in Plymouth in September 2009, it was decided that the *9th International Symposium on Cretaceous System* will be convened in 2013 at Ankara, Turkey. The Symposium is now scheduled for September 2013 and will be hosted by the Middle East Technical University in Ankara. For up-dated informations visit the WebSite http://www.cretaceous2013.org/en/. Contact Person: Ass. Prof. Dr. Ismail Omer Yilmaz <ioyilmaz@metu.edu.tr>.

The Subcommission also liaises closely with the Subcommission on Jurassic Stratigraphy, especially over the definition of the Jurassic/Cretaceous boundary.

When appropriate, the Subcommission liaises also with IGCP projects. In particular, a strong liason was established by our collegues from IGCP 507 – "Cretaceous paleoclimatology", and IGCP Project 506 - Marine and Non-marine Jurassic: Global correlation and major geological events (Project Co-Leader W. Wimbledon).

ICS has always been directly or indirectly linked to important international Projects as IODP, IGCP, and CHRONOS (Mesozoic Planktonic Foraminifera Working Group, MPFWG).

5. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2011

General Activities

The chair of the Cretaceous Subcommission called for the election of its chair and vice-chair(s). As several nominations have been received, the procedure will be completed soon. The results will be forwarded to ICS Executive for approval before the end of 2011.

A wealth of data on various aspects of Cretaceous stratigraphy had continued to be published in 2011 providing a continuous amelioration of the multiple stratigraphic framework that today spans the whole Cretaceous in increasing higher resolution.

Increasing knowledge on carbon isotope stratigraphic patterns and magnetostratigraphy from continuous pelagic successions, especially deep-sea, through the Cretaceous, provoked an increase of interest in the scientific community for a more traditional stratigraphic aspects. In 2011 this resulted in an increase of actvities among the ammonite specialists as well as on other fossil groups and other proxie tools. In particular, the Cretaceous Subcommission members have been very active in revising ammonite taxonomy and stratigraphic distribution of key taxa; and field trips to solve specific topics have been organized visiting some key sections (i.e. Albian, Berriasian type-area, etc.). In addition, the Berriasian Working Group called one official meeting in October (Sofia, Bulgaria) and the exhaustive report of the activities up to the 2009 Plymouth meeting with the chairperson

(Wimbledon) as first author in collaboration with numerous WG members is now out of press. Important Cretaceous issues have been considered also by the IGCP 555 - "Rapid Environmental/Climate Change in the Cretaceous Greenhouse World: from Ocean to Land" (referente below).

Of general interest:
The final results of IGCP 555 – "Rapid Environmental/Climate Change in the Cretaceous Greenhouse World: from Ocean to Land" have been published in 2011 in a special issue of Sedimentary Geology (v. 235, 1-2, 132 pp.), that includes 13 articles.

The Kilian Group (Lower Cretaceous Ammonite Working Group).

The full report of the 4° meeting of the Kilian Group, held at the University of Burgundy at Dijon (France), on 30 August 2010, was published in Cretaceous Research in 2011. Its authors are Reboulet (chair), Rawson and Moreno-Bedmar (reporters), and 23 co-authors from Argentina, Austria, Bulgaria, Czech Republic, France, Hungary, Madagascar, Mexico, Russia, Spain, and United Kindom. The published report includes also the written communications by not attending members and a Table of the standard zonation from Berriasian to Albian.

The Kilian Group confirmed the plans to have the next meeting in September 2013 at the 9° International Symposium on the Cretaceous System in Ankara (Turkey). For the new meeting the Kilian Group is expected to focus on the Berriasian, Valanginian and Hauterivian stages and to calibrate different ammonite zonations of the Tethyan, Boreal and Austral realms with the "standard" Mediterranean region zonation.

Stéphane Reboulet, Peter F. Rawson, Josep A. Moreno-Bedmar, Maria B. Aguirre-Urreta, Ricardo Barragán, Yuri Bogomolov, Miguel Company, Celestina González-Arreola, Vyara Idakieva Stoyanova, Alexander Lukeneder, Bertrand Matrion, Vasily Mitta, Hasina Randrianaly, Zdenek Vasicek, Evgenij J. Baraboshkin, Didier Bert, Stéphane Bersac, Tamara N. Bogdanova, Luc G. Bulot, Jean-Louis Latil, Irina A. Mikhailova, Pierre Ropolo, & Ottilia Szives, 2011. Report on the 4th International Meeting of the IUGS Lower Cretaceous Ammonite Working Group, the **"**Kilian Group**"** (Dijon, France, 30th August 2010). Cretaceous Research, v. 32, p. 786-793.

The Berriasian GSSP and the J/K boundary.

This is a summary of progress for the Berriasian WG, amended from the report given at its Sofia meeting, written by the chair, W.A.P. Wimbledon.

Meetings

The Working Group held a very successful meeting in Sofia in October 26-28, 2011, hosted by the Geological Institute of the Bulgarian Academy of Sciences. Local organisers were Drs Kristalina Stykova, Daria Ivanova, Iskra Lakova and Platon Tchoumatchenco. Two days of meetings, of presentations (poster and oral) and workshops on ongoing team studies on Berriasian sites, were complemented by a field excursion to the J/K boundary site at Barlya on the Bulgarian/Serbian border. In addition, the chairman as part of a survey of group's progress, was able to present limited materials from WG members who could not be present at the meeting, notably on Tibet, from Dr Li Jianguo and Dr Wan Xiaoqiao.

The chairman opened the meeting with apologies for absence from a large number of friends who are active WG members. And then gave an account of progress that is being made through team activity, notably in France and Crimea, with continuing activity in Italy and central Europe, but highlighting new prospects for cooperation in Iraq, Tibet and China/Russia. Papers and posters are listed in the appendix to this text. Two additional papers, not listed below, were read by Daniela Reháková (on capionellid results from Le Chouet) and another by Luc Bulot (on first ammonite results from Le Chouet). A most valuable part of the meeting was the time allocated to meet new participants and to discuss, and for group work on WG shared site projects

A WG meeting in Tunisia that had been planned for early 2011 was postponed due to political changes. Happily, it has now been re-scheduled for May 2012 under the guidance of Dr. Mabrouk Boughdiri and colleagues at the University of Carthage, Bizerte. A meeting that we anticipate with much pleasure.

New members joining the WG

Since the last WG meeting, in Paris, the following valued colleagues have joined the group: Pierre Olivier Mojon (Switzerland), Ibrahim M.J. Mohyaldin (Iraq), Jennifer Galloway (Canada), Andrea Concheyro (Argentina), Subhendu Bardhan (India), Dhirendra Pandey (India), Li Jianguo (China), Wan Xiaoqiao (China), Oksana Dzyuba (Russia), Emile Pessagno (USA)

Activity of the Working Group, work in progress

Progress has been made on a broad front. Below are a few highlights, building upon earlier discussions and announcements.

The WG has held six workshops since the first tentative discussion in Bristol, plus a short meeting at the Plymouth Cretaceous Symposium. New members are listed above and new projects are mentioned below. The implementation of the early WG decision to study the interval between the *Berriasella jacobi* subzone base and the *Pseudosubplanites grandis* subzone base is spreading. The WG continues to localise and calibrate a number of key markers, and expand activity to new regions. Developments are as follows:

BOREAL

Canada: New palynological studies of the Sverdrup basin are in progress by Jennifer Galloway New paleogeographic maps are in preparation and news on that is expected from Terry Poulton soon.

Russia: Continued progress is being made by members of the WG on the issue of making connections outward from the landlocked Russian boreal. Notably Mitta with his correlation of Tethyan ammonites, and Peschevitskaya et al. and Harding et al. who have published two substantial works on the palynology. Similarly by Oksana Dzuba working on belemnites and chemostratigraphy (see reference list below).

Greenland: Peter Alsen is studying newly collected ammonite material from Kuhn Ø

TETHYS

France: At Le Chouet, further nannofossil and calpionellid samples were collected from the top part of the profile in September 2011, in *jacobi* subzone (Rehakova, Halasova, Casellato). Dense geochemical sampling commenced in September (Schnyder and Galbrun), and the rich ammonite fauna from the Durangites/B. jacobi interval was further expanded (Frau, Bulot, Wimbledon). Magnetozone boundaries at Le Chouet were refined, and new sampling was started in the *P. grandis* subzone at St Bertrand's Spring (Les Combes) (Pruner/Grabowski teams)

Slovakia/Poland: The Bratislava, Warsaw and Prague teams are active on sites in southern Poland and Slovakia, notably on the Strapkova locality (Sofia presentation below, Michalik et al.).

Italy: Work progresses at several sites, (1) Integrated calcareous nannoplankton and calpionellid biostratigraphy at Torre dei Busi, Monte Pernice (southern Alps) and Guidaloca (Sicily) and DSDP Site 574 (Casellato, Erba, Andreini and Parisi); (2) In Umbria-Marche, integrated Tithonian-Valanginian magneto- and biostratigraphy across at Fonte del Giordano, and also at Curasci (Andreini, Parisi, Perilli and Speranza).

In addition, Andreini and Parisi study chitinoidellid biostratigraphy in Southern Spain.

Bulgaria: Komshtitsa/Barlya: new work on the magnetostratigraphy was started with preliminary collecting by the Prague team in October 2011. To add to the previous biostratigraphic analysis by Lakova, Tchoumatchenco et al.

Berende: nannofossils and ammonites are still being collected from this promising profile (Stoykova, Ivanov), and results are predicted to be given at the Tunisia meeting,

Tunisia: Two important demonstrations of the Tunisian sequences were given at the Sofia meeting (by Houaida Sallouhi and Sana Ben Nsir). The first magnetostratigraphic collecting in Tunisia will begin March 2012 (Boughdiri team, Wimbledon), to be continued in May (Schnabl).
Morocco: Mohamed Benzaggadh presented new results from Morocco at the Paris meeting.
Mexico/Cuba: Ricardo Barragan and Rafael Lopez continue their bed by bed analysis of key Mexican sites. First presentation of results were given in Sofia.
Ukraine: Work on calpionellids, nannofossils (Rehakova, Halasova, Casellato) and ammonites continues - from the *B. jacobi* subzone, and Daria Ivanova joins the team to examine the anomalous foraminiferal faunas. Sampling at higher levels in *P. grandis* subzone commenced in 2011. Magnetostratigraphy is in its third season (Bakhmutov, Sofia presentation detailed below).
Tibet: Drs Li Jianguo and Wan Xiaoqiao have joined the WG, studying Tibetan palynology and ammonites and nannofossils, respectively. They currently make an analysis of the best prospect for future research in the Cimmerian and Eurasian terrains of Tibet, and the integration of previously separately obtained data on ammonites and microfossils, plus palynology. A next step will be the first magnetostratigraphic study.

SUB TETHYS/GONDWANA

Iraq: Dr Ibrahim Mohyaldin has worked on the chemostratigraphy of the Berriasian in Turkestan. The first palaeontological fieldwork in the type area of the Chia Gara formation for 60 years is due to take place in June 2012. Dr Michael Howarth has been assisting with work on older ammonites collections, to help localise the activity in the most productive areas. Also. the first-ever collecting for microfosslis is intended, and Kristalina Stoykova and Emile Pessagno have volunteered to look at preliminary materials for nannofossils and radiolaria.
Yemen: No activity is possible in the field because of the political situation. But it is intended to do some sampling of recently collected, well-localised macrofossils from the top Tithonian-lower Berriasian to see if they yield useful calcareous nannofossils.
India: Kutch: reconnaissance for nannofossil sampling is due in January 2012, to be undertaken by Dr Pandey.
Argentina: New work on nannofossil and ammonite integration in the Vaca Muerta formation is in progress by our colleagues Vennari, Lescano and Concheyro.
Work in Iraq may give new opportunities for links and collaboration with friends in Argentina, for there are distinct faunal (ammonite) links already identified.

NON MARINE

United Kingdom: Non-marine Purbeck: the M19-M18 magnetostratigraphic interval was sampled extensively (300 samples) in June 2011 by colleagues Pruner, Schnabl and Slechta.
China/Russian far east: Fieldwork on non-marine/marine correlation is planned for 2012 by Jingeng Sha, Eugenia Bugdaeva and Valentina Markevich. Research is at the planning stage.

BERRIASIAN MAP PROJECT

Dr Chris Scotese (Geomap Project) is providing his invaluable expertise through the creation of a new base map for use in the group work. Several colleagues, notably Alberto Riccardi, Peter Rawson and Terry Poulton, have already contributed most valuable materials to help to make an accurate reconstruction for the earliest Berriasian.

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APPENDIX - Talks and posters at the Sofia 2011 workshop

Wimbledon, W. - Progress generally for the WG, and at Le Chouet and in Crimea specifically.

Michalík J., Reháková D., Lintnerová O., Halásová E. - Complex stratigraphy of another key J/K Boundary section (Strapková) in the Pieniny Klippen Belt (Western Carpathians, Slovakia).

Grabowski, J., Pruner, P., Schnabl, P., Sobien, K., Šifnerová, K. - Magnetostratigraphic results from the J/K section at Le Chouet (France).

Rogov, M. - Changes in ammonite assemblages across the J/K boundary in the Panboreal Superrealm: speciation, extinction and immigrational events.

Pestchevitskaya, E., Lebedeva, N., Ryabokon, A. - Uppermost Jurassic and lowermost Cretaceous dinocyst successions of Siberia, Subarctic Urals and Russian Platform and their interregional correlation.

Guzhikov, A. - Berriasian bio- and magnetostratigraphy of Feodosia region (Mountainous Crimea).

Dzyuba, O., Izokh, O., Shurygin, B. - Carbon isotope composition and correlation across the Jurassic-Cretaceous boundary: new data from north of Asia (Russia).

Zakharov, V. - What must be key event to define a GSSP for the base of the Berriasian?

Wimbledon, W. - How is the base of the Calpionella alpina Subzone defined?

Lakova, I., Ivanova, D., Petrova, S., Boncheva, I. - Joint microfossil events and bioevents on calpionellids, calcareous dinocysts and radiolarians across the Jurassic/Cretaceous boundary interval in the West Balkan Mts, Bulgaria.

Boughdiri, M., Sallouhi, H., Ben N'sir, S. - Ammonite-supported calpionellid biostratigraphy in Central and Northern Tunisia.

Ben N'sir, S., Boughdiri, M., Sallouhi, H. - Radiolarians, biomicrofacies and calpionellids of the Upper Jurassic-Lower Cretaceous in the "Tunisian Trough".

Ben N'sir, S., Boughdiri, M., Sallouhi, H. - Preliminary results on calpionellid and ammonite biozonations across the Jurassic/Cretaceous boundary in the Tunisian Dorsale (the type section of J. Beni Kleb).

Bakhmutov, V., Wimbledon, W.A.P. - Magnetostratigraphy of the Lower Berriaisan sediments of Feodosia, eastern Crimea (Ukraine): preliminary results

Michalík, J., Reháková, D., Lintnerová, O., Halásová, E. - Complex stratigraphy of the key J/K Boundary sections in the Pieniny Klippen Belt (Western Carpathians, Slovakia)

Arkadiev, V., Platonov, E. - Correlation of the Jurassic-Cretaceous boundary of the Mountainous Crimea and Western Europe.

Bakhmutov, V., Wimbledon, W. - Magnetostratigraphy of Lower Berriasian sediments from Eastern Crimea (Feodosia, Cape St. Elias).

Lopez-Martínez, R. A. - Calpionellid biostratigraphy and facies evolution across the Jurassic/Cretaceous boundary in western Cuba and Mexico.

Antuñano, S., López-Martínez, R. - An unconformity at the base Cretaceous in Mexico: Its significance around the world.

Zakharov, V., Rogov, M. - The Nordvik section (Laptev Sea), GSSP candidate for the Ryazanian Stage and reference section for the J/K boundary of the Panboreal Superrealm.

Arkadiev, V., Guzhikov, A., Bagaeva, M., Manikin, A., Perminov, V., Yampolskaya, O. - New data on Tithonian–Berriasian Bio- and Magnetostratigraphy of Feodosia region (Mountainous Crimea).

Dzyuba, O. - Correlation of the J/K boundary strata based on cylindroteuthid belemnites.

Base Valanginian GSSP.

In the absence of magnetic signals in the Montbrun-les-Bains section, so far the primary candidate for the Valanginian GSSP, and in general in all the southern France successions, scientists from Spain suggest that the alternate sections near Caravaca (SE Spain) should be reconsidered by the WG. The detail synthesis of the biostratigraphic and magnetic events provided by Aguado et al. (2000) shows that the Spanish sections, especially the Caneda Luega, are the only ones in the world where a direct correlation could be made between magnetic chrons and ammonite-nannos-calpionellid zones at this level. Meanwhile, Stephane Reboulet and colleagues are currently gathering new data at Montbrun-les-Bains (S. France) and, in addition, are planning to study with a multidisciplinary approach the Vergol section, which has the advantage to comprise also the base of the upper Valanginian.

The chair of the Valanginian WG, Luc Bulot, and the Spanish collegues are looking if a WG meeting can be organized at short issue. Bulot is also exploring the possibility of having a field trip in the Caravaca area in Spring 2012 to look at the Caneda Luega-Cehegin sections.

Base Hauterivian GSSP.

Since October 2010 when Luc Bulot (chair of the WG) and I. Premoli Silva (SCS chair) started to assembling the data available so far on La Charce section (Drome, France), the major candidate for the Hauterivian GSSP, the draft of the proposal did not make any progress due to new problems, such as the need of new sampling for up-dating the nannofossil and planktonic foraminiferal distributions across the Valanginian/Hauterivian boundary. Moreover, the chair Luc Bulot was deeply involved on collecting and studying Berriasian ammonites from Le Chouet. Hopefully the Hauterivian GSSP proposal will be completed in 2012.

Base Barremian GSSP.

The formal proposal of the Río Argos section as GSSP of the Barremian stage is in advanced preparation by the chairman, Miguel Company, and the numerous members of the Task Group. A multidisciplinary study was carried out on the section, including ammonites (J. Sandoval, J.M. Tavera and M. Company), calcareous nannoplankton (R. Aguado), planktonic and benthonic foraminifera (R. Coccioni, F. Frontalini and L. Giusberti), organic matter (F. Baudin), stable isotopes (H. Weissert), and multi-proxy cyclostratigraphy (a team from the University of Dijon).

Unfortunately, the magnetostratigraphic methods could not be applied because of a strong Neogene remagnetization that hinders any correlation with the magnetic polarity scale. Nevertheless, an indirect calibration is possible (although not very accurate) through data from the Gorgo a Cerbara section (central Italy). The identification and characterization of the boundary event (First Occurrence of *Taveraidiscus hugii*) in the section do not pose any problem, as ammonites are abundant and well preserved. The main problem the Task Group faces is the correlation of this event to other palaeogeographic domains (as Boreal or Andean regions) because of the strong provincialism displayed by faunas, microfaunas and microfloras at that time.
The report is expected will be finished by the end of 2011 to be presented to the members of the Barremian Working Group and, then, to the Subcommission.

Base Aptian GSSP.
A wealth of data have been collected and published on the Aptian stage in the last few years by our French collegues on the stratotype sections of the Bedoulian and Gargasian substages including revised biostratigraphies, $\delta_{13}C$ curve and cyclostratigraphy (see Moullade et al., 2009, Ann. Muséum Hist. Nat. Nice, v. 24/1). Although magnetic signature in the French stratotype sections cannot be detected, carbon isotope data allowed a precise correlation between the base of magnetic chron M0, recommended at the 1995 Brussels Meeting for identifying the base of the Aptian, and the Aptian basal ammonite *Deshayesites oglanlensis* Zone. The formal proposal of the Aptian GSSP at Gorgo a Cerbara (central Italy) is still pending.

Base Albian GSSP.
As reported in previuos reports, the formal proposal for the base Albian at Tartonne (SE France), prepared by J. Kennedy, never reached the quorum. Voting Members against the proposal commented that the change of lithofacies at the critical level (from marl to organic-rich laminated black shale), the regional/provincial distribution of the index-species *Leymeriella (L.) tardefurcata,* and the low stratigraphic value of ancillary markers (few, poorly diagnostic planktonic foraminifera; *Predicosphaera* taxonomic problems, etc.) makes the Tartonne section unsuitable as the base Albian GSSP. In addition, the sampling across the Aptian/Albian boundary was considered at a resolution not adequate for such critical interval and the proposed event (FO of *L. tardefurcata*) is poorly applicable to other sections, especially outside SE France.

In Spring 2010 members of the new Working Group, set up at Plymouth in 2009 (Paul Bown, coordinator), re-sampled at high resolution the Col de Pré-Guittard section, Kennedy's ancillary section near tartonne. A multidisciplinary study of the new sample set was carried out during 2011 by members of the WG. One of the most important results concerns the planktonic foraminifera which display a major turnover across the Niveau Kilian, in correspondence with a 1‰ delta13C escursion. A paper describing exhaustively this abrupt turnover was already submitted by Petrizzo and co-authors to be published on NewsLetters on Stratigraphy. Meanwhile, a formal proposal dealing with a new criteria for identifying the base Albian, replacing the FO of the unsuitable *L. tardefurcata*, is in preparation.

Base Coniacian GSSP.
The main paper describing the criteria for identifying the base Coniacian and the proposal of a candidate composite GSSP section was published in Acta Geologica Polonica at the end of 2010. Besides multiple up-dated biostratigraphies, the paper also includes the isotope curves for both the Salzgitter-Salder (northern Germany) and Slupia Nadbrze~na (central Poland) sections. It is confirmed that the inoceramid-based lower Coniacian boundary (= first appearance of *C. deformis erectus*), slightly post-dates the traditional ammonite (FAD of *Forresteria petrocoriensis*) position of the boundary.

Last September the chair of the WG, Irek Walaszczyk, circulated the published proposal to the Working Group members asking for comments and eventually approval. So far, nine members replied but more replies are expected soon. For the time being all replies support the proposal of having a composite section as a base Coniacian GSSP. Although it is not an ideal choice, there is not a single perfect section which satisfies the GSSP for the base of the Coniacian. The formal proposal to be submitted to the Voting Members of the Subcommission is now in preparation by the WG chair.

I. Walaszczyk, C. J. Wood, J. A. Lees, D. Peryt, S. Voigt & F. Wiese, 2010. Salzgitter-Salder Quarry (Lower Saxony, Germany) – Slupia Nadbrzena river cliff section (central Poland): a proposed candidate composite Global Boundary Stratotype Section and Point for the Coniacian Stage (Upper Cretaceous). Acta Geologica Polonica, v. 60/3, 445-477.

Base Santonian GSSP.

The final proposal for the base Santonian at Olazagutia (Spain), prepared by the chair Marcos Lamolda, was distributed for approval and/or comments to the Voting Members of the Subcommission three times since 2008, and finally reached the quorum of positive votes in 2010. On October 1, 2010 the proposal was returned to the WG chair for an up-date and few corrections. The final GSSP proposal was submitted to the ICS on 20 December 2010. On 29 May 2011 the Santonian GSSP proposal was circulated to the Commission Voting Members for comments. The proposal along with the comments was sent back to M. Lamolda on 8 July 2011 for corrections and editing. The final version was returned to ICS on 3 October 2011 and is waiting for the ballot.

Base Campanian GSSP.

Members of the WG have been searching for a new section across the Santonian/Campanian boundary to be proposed as base Campanian GSSP. So far, the only section not affected by hiatus and/or major dissolution is the Bottaccione section (Gubbio, central Italy), in which the calcareous plankton bioevents are calibrated to magnetostratigraphy. The distribution of planktonic Foraminifera across the Santonian-Campanian interval at Bottaccione was recently revised and up-dated (Petrizzo et al. 2011). Moreover, as the available carbon isotope stratigraphy was considered at too low resolution for reliable supraregional correlations, a new sets of carbon isotope analyses across the critical interval were undertaken by Silke Voigt on the original samples (Premoli Silva & Sliter 1995), calibrated to paleomagnetic scale, and on new samples collected at higher resolution along the same road section and on the opposite side of the valley by Gale and Voigt. A paper with the obtained carbon isotope curves correlated to that from Laegerdorf (N Germany) is ready to be submitted for publication. The main bias of the Bottaccione section is that planktonic foraminifera across the critical interval could not be properly disaggregated from the hard limestones, using cold acetolyse method, and are poorly preserved.

M.R. Petrizzo, F. Falzoni & I. Premoli Silva, 2011. Identification of the base of the lower-to-middle Campanian *Globotruncana ventricosa* Zone: Comments on reliability and global correlations. Cretaceous Research, v. 32, 387-405.

Base Maastrichtian GSSP.

To overcome the problem of correlation between the GSSP and coeval sections, stable isotopes were measured in high resolution from Tercis les Bains GSSP (Thibault et al. 2011). In this paper the Tercis isotope curve was successfully correlated to the isotope curve from two Danish Basin cores (DK), that could represent the standard carbon isotope curve for the Boreal realm being calibrated to the nannofossil and dynocyst biostratigraphies. Moreover, Gardin et al. revised the biostratigraphy of the Bottaccione section, already calibrated to magnetostratigraphy, and gathered new calcareous plankton biostratigraphic and magnetostratigraphic data of the upper Campanian-Maastrichtian interval form the nearby Contessa section (Gubbio, central Italy). The latter section was also sampled for stable isotopes in fall 2010 by Silke Voigt who completed the analyses in 2011. The Contessa and

Bottaccione isostope curves, correlated to her new one from Tercis GSSP, will be presented in a specific paper which should be published very soon.

N. Thibault, R. Harlou, N. Schovsbo, P. Schiøler, F. Minoletti, B. Galbrun, B.W. Lauridsen, E. Sheldon, L. Stemmerik & F. Surlyk, in press. Upper Campanian-Maastrichtian nannofossil biostratigraphy and high-resolution carbon-isotope stratigraphy of the Danish Basin: Towards a standard d13C curve for the Boreal Realm. Cretaceous Research (2011), 19 pp. doi:10.1016/j.cretres.2011.09.001

6. CHIEF PROBLEMS ENCOUNTERED IN 2011

The need nowadays for a high-resolution framework to be exportable worlwide resulted in the necessity of re-visiting several candidate sections, already studied paleontologically, by implementing multiple biostratigraphies and stratigraphic tools other than fossils - those are profoundly affected by bioprovincialism in several intervals - like magnetostratigraphy, stable isotope stratigraphy, etc. In several cases, especially in the Late Cretaceous, the integration of multiple bio-, physical stratigraphies revealed that the candidate sections were unsuitable as GSSP. Consequently, new sections had to be searched and studied from the beginning. This resulted in a delay in submitting the GSSP proposals, taking also into account that scientists from different subdisciplines do not necessarily work at the same speed.

Another problem is the lack of fundings in most countries for carrying out studies strictly stratigraphic, apparently poorly fashionable, for attending workshops and/or conferences.

7. SUMMARY OF EXPENDITURES IN 2011 (ANTICIPATED THROUGH MARCH 2012):

I. INCOME

ICS subvention for 2011 (4000 $)	Euro 2785.00
Total income	Euro **2785.00**

II. EXPENDITURE

Contribution to J/K meeting, Sofia (organization+lodging)	Euro 1000.00
Contribution to Ukraina field work	Euro 600.00
Attendance to Italian Strat. Commission Meeting GEOITALIA2011 – Turin, 21 Sept (Chair)	Euro 178.00
Attendance to MPFWG meeting, Washington, 26-30 Sept (partial) (Chair)	Euro 350.00
1st Contribution to J/K meeting in Bizerte (Tunisia)	Euro 500.00
Office (chair & secretary) expenses	Euro 150.00
Bank Expenses	Euro 20.00
Total expenditure	Euro **2798.00**

8. WORK PLAN, CRITICAL MILESTONES, ANTICIPATED RESULTS AND COMMUNICATIONS TO BE ACHIEVED NEXT YEAR (2012):

Membership of Cretaceous Subcommission.
Several Voting Members of the Cretaceous Subcommission will terminate their mandate with the 34th Geological Congress, August 2012. Call for nominations is underway and the new membership is expected to be completed at the beginning of 2012.

Meetings
- The 8° meeting of the Berriasian and J/K boundary WG is planned in Tunisia (Bizerte), May 2012
- The 9° meeting of the Berriasian and J/K boundary WG in Russia, prior to or after the 6th meeting of the "Cretaceous of Russia and adjacent regione" in September 2012, in Gelendzhik (Caucasus) (organizer E. Baraboshkin).
- Valanginian Workshop and field trip, Caravaca area, Spain, pending.

Work Plan and anticipated Results
- To bring recommendations for the remaining GSSPs to ICS as soon as possible.
- Submission of the Santonian GSSP to ICS
- Votes on the Coniacian GSSP and submission to ICS after Subcommission approval
- Votes on the Hauterivian GSSP and submission to ICS after Subcommission approval
- Preparation of the first draft on Aptian GSSP
- To complete the study of the Col de Pré-Guittard section for the Albian GSSP, preparation of the formal proposal and submission to ICS after Subcommission approval
- Definition of criteria for identifying the base of the Berriasian and the J/K boundary
- Choose the appropriate section for the Campanian GSSP

9. BUDGET AND ICS COMPONENT FOR 2012

Office expenses (Fax, phone, postage, etc)	Euro 150
2nd Contribution to the J/K Tunisia Meeting (organization)	Euro 500
Support to participants to the J/K Tunisia Meeting	Euro 1500
Support to J/K field trips (i.e Ukraina, S France, others)	Euro 1500
Participation di 34st IGC Brisbane (Registration, Air Ticket, Lodging) (chair)	Euro 2900
Total estimated expenditure	**Euro 6550**

10. SUMMARY OF CHIEF ACCOMPLISHMENTS OVER PAST FIVE YEARS (2007-2011)

See Accomplishments in ICS Annual Reports 2007 to 2011 (above) for additional details.
- Renewed research by WG members (resulting in a great number of publications, still ongoing), based on research needs pinpointed by the 1995 Brussels, 2005 Neuchâtel, 2008 Oslo and 2009 Plymouth meetings.
- Set up of the renewed Working Group on the Berriasian GSSP and the J/K boundary, chaired by W.A.W. Wimbledon (Dec. 2006-Spring 2007).

- 2nd Workshop of the Kilian Group on the Hauterivian-Barremian zonation, held in Digne-les-Bains (May 2007), from the **Radiatus** (base of the Hauterivian**)** to the **Sarasini** (top of the Barremian) zones.
- 3rd Workshop of the Kilian Group on the Hauterivian and Barremian zonation, held in Vienna (April 2008)
- 1st official meeting of the renewed Working Group on the Berriasian GSSP and the J/K boundary, chaired by W.A.W. Wimbledon in Bristol (July 2007).
- 2nd official meeting of the Working Group on the Berriasian GSSP and the J/K boundary, chaired by W.A.W. Wimbledon in Marseille (July 2008).
- 33° Geological Congress, August 2008, Olso: SCS Symposium on "Stratigraphic subdivisions of the Cretaceous System: State of the Art". (Conveners: I. Premoli Silva, F. Surlyk & I. Walaszczyk).
- 3rd official meeting of the Working Group on the Berriasian GSSP and the J/K boundary, chaired by W.A.W. Wimbledon in Milan (March 2009).
- 4th official meeting of the Working Group on the Berriasian GSSP and the J/K boundary, chaired by W.A.W. Wimbledon in Plymouth (September 2009).
- 5th official meeting of the Working Group on the Berriasian GSSP and the J/K boundary, chaired by W.A.W. Wimbledon in Smolenice (Slovakia) (April 2010).
- 4th Workshop of the Kilian Group on the Aptian and Albian zonation, held in Dijon (August 2010).
- 6th official meeting of the Working Group on the Berriasian GSSP and the J/K boundary, chaired by W.A.W. Wimbledon in Paris (November 2010).
- 7th official meeting of the Working Group on the Berriasian GSSP and the J/K boundary, chaired by W.A.W. Wimbledon in Sofia (October 2011).

The Chair and/or Vice Chair represented the SCS at:

1° meeting of the *Berriasian and J/K boundary Working Group*, Bristol (UK), July 2007
2° meeting of the *Berriasian and J/K boundary Working Group*, Marseille, July 2008
SCS Symposium HPS-10 on "Stratigraphic subdivisions of the Cretaceous System: State of the Art". (Co-conveners: I. Premoli Silva, F. Surlik & I. Walaszczyk), at 33° Geological Congress, August 2008, Olso:
3° meeting of the *Berriasian and J/K boundary Working Group*, Milan, March 2009
4° meeting of the *Berriasian and J/K boundary Working Group*, Plymouth, September 2009
5° meeting of the *Berriasian and J/K boundary Working Group*, Smolenice, April 2010
ICS Meeting, Prague, May 2010

11. OBJECTIVES AND WORK PLAN FOR NEXT 4 YEARS (2011-2015)

Meetings

- May 2012 – the 7th Workshop of the Berriasian and J/K boundary WG in Tunisia
- August 2012 - Subcommission Official Meeting at the 34th International Geological Congress, Brisbane, Australia
- September 2013 – 9th International Symposium on Cretaceous System, Middle East Technical University, Ankara, Turkey. Convenor: Ismail Omer Yilmaz

- September 2013 – 5^{5h} Workshp of the Kilian Group at the 8th International Symposium on Cretaceous System, Ankara.

Details of other meetings are not yet available.

Objectives

- To submit the proposal of Santonian GSSP to ICS, and to submit it to Episodes for publication
- To submit the proposal of Coniacian GSSP to ICS, and to submit it to Episodes for publication
- To submit a new proposal of Albian GSSP to the Cretaceous Subcommission Voting Members, then to submit it to ICS, and possibly to Episodes for publication
- To submit the proposal of Barremian GSSP to the Cretaceous Subcommission Voting Members, then to submit it to ICS, and possibly to Episodes for publication
- To bring recommendations for the remaining GSSPs to ICS as soon as possibile
- To propose the definition of criteria for identifying the base of the Berriasian and the J/K boundary
- To communicate the results as widely as possible
- To develop new directions for the Subcommission as GSSP proposals are completed

Specifically, future objectives will concern the subdivision of stages, with definition of substages and related GSSPs.

Work Plan

2012 – Finalize the proposal for the base of the Albian
2012 - Finalize proposals for the base of Valanginian, Hauterivian, Barremian, Aptian, Coniacian, and possibly Campanian
2012-2013 - Finalize the proposal for the base of Berriasian (Jurassic/Cretaceous boundary)
2011 to 2013 – Definition of substages.

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

Subcommission officers (with addresses)

Chair: Prof. I. Premoli Silva
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Secretary: Dr. Silvia Gardin
CNRS-CR2P "Centre de Recherche sur la Paleobiodiversite et les Paleoenvironments", case 104, University of Paris VI, 4, Place Jussieu, 75252 Paris, FRANCE
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List of Voting Members

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List of Task Groups and their officers

Maastrichtian WG: *GSSP ratified.* Giles Odin, France. gilodin@moka.ccr.jussieu.fr
Campanian WG: jim.kennedy@oum.ox.ac.uk, Andy Gale (UK) Andy.Gale@port.ac.uk
Santonian WG: Marcos Lamolda, Spain. mlamolda@ugr.es
Coniacian WG: Irek Walaszczyk, Poland. i.walaszczyk@uw.edu.pl
Turonian WG: *GSSP ratified*. No chairman at present.
Cenomanian WG: *GSSP ratified.* No chairman at present.
Albian WG: Malcolm Hart, UK. mhart@plymouth.ac.uk
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Kilian Group *[formerly Lower Cretaceous ammonite WG]:*
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