Minutes of the Business meeting of the

INTERNATIONAL SUBCOMMISSION ON CRETACEOUS STRATIGRAPHY

https://cretaceous.stratigraphy.org/

at the 37th International Geological Congress - IGC 2024 in Busan

26 August 10.30 – 12.00
Busan Youth Hostel Arpina (Nuri)

List of participants:
Maria Rose Petrizzo, Michael Wagreich, Ian Jarvis, Elisabetta Erba, Takashi Hasegawa, Danpeng Xi, Eun Young Lee, Byung-Do Choi, Masashi Ikeda, Hu Jianfang, Mayuko Kamimura, Yanhong Pan, Yaqiong Wang.

Welcome from the Executive (term 2016 – 2024) Maria Rose Petrizzo retires after 8 very successful and largely enjoyable years serving as Chair, Michael Wagreich retires after 8 years as Vice-Chair and 4 years as voting member (12 years in total).

Presentation of the new Executive and members for the term 2024 – 2028

a. Executive

Incoming Chair: Ian Jarvis, Vice-Chair: Francesca Falzoni, Secretary: Zofia Dubicka.
Ian Jarvis had served as a voting member for 8 years and Francesca Falzoni was Secretary for the previous 8 years. Noted that the Secretary is appointed by the Chair and not subject to election by the Cretaceous Subcommission voting members.

b. Voting members

Continuing members: Sietske Batenburg, Paul Bown, Bruno Granier, Eduardo Koutsoukos, Josep Moreno Bedmar, Bilal Sari, Brad Singer, Markus Wilmsen, Dangpeng Xi, Maria Rose Petrizzo.

New voting members comprise: James Crampton, Reishi Takashima, Shin-Ichi Sano Delphine Desmares, Polina Pavlishina, Jean Marie Self-Trail.

c. Corresponding members

A new category of corresponding members had been established, like those previously in place for other Subcommissions. These were to comprise current voting members retiring after the end of their 12 years mandates. Corresponding members will comment

on GSSP proposals and other activities of the Subcommission but will not be able to vote for GSSPs or in elections.

Corresponding members will comprise: Michael Wagreich, Ismar de Souza Carvalho, Bruno Galbrun, Takashi Hasegawa, Brian Huber, Brad Sageman, Silke Voigt, Irek Walaszczyk.

Overview of the Ratified GSSPs and dedication of the golden spike GSSPs

Five GSSPs had been ratified over the last 8 years:

a. Hauterivian GSSP ratified in 2019 – ceremony June 2024
b. Barremian GSSP ratified in 2023 – ceremony November 2024
c. Albian GSSP ratified in 2016 – ceremony June 2024
d. Coniacian GSSP ratified in 2021 – ceremony September 2023
e. Campanian GSSP ratified in 2022 – ceremony July 2023

This represents the highest success rate amongst all ICS Subcommissions during recent years and was regarded as exemplary by the ICS Committee. It would not have been possible without the dedicated effort of all Working Group members, and the continued encouragement and support by the Chair.

The forthcoming Barremian ceremony to be held in Caravaca SE Spain on the 9th November 2024 was being organized by Miguel Company. Subcommission members are encouraged to attend the event. They should contact Miguel - mcompany@ugr.es - if they wish to do so.

Valanginian GSSP proposal approved by the Cretaceous Subcommission on 15 August 2024

The Vergol section (Drôme, SE France) GSSP with a SABS at the Cañada Luenga section (Cehegín, Spain) proposal had been unanimously approved by the Subcommission. The base of the stage is defined at a point indicated by the first occurrence of the ammonite species *“Thurmanniceras” pertransiens*. The proposal was voted by the 95% of the eligible voters (19/20, one member did not cast a vote) and received the 100% of agreement (19/19 of “yes” votes). The site met all criteria required for a GSSP. An age of 137.05 Ma was proposed for the boundary based on cyclostratigraphy-astrochronology age modelling.

The proposal is now under review by ICS and will be assessed by the incoming Executive and Subcommission chairs members during September 2024 with voting during October 2024. Rapid input from the Valanginian WG may be required during the assessment period to provide feedback on ICS members’ requests for clarification. Further amendments could be required. If approved, the proposal would progress to ratification by the IUGS during late 2024.

Updates on the activities of the Working Groups
Working Groups have a maximum term of 8 years. Currently active groups comprise the Aptian, Berriasian and Maastrichtian.

Berriasian WG, Chair Jacek Grabowski – appointed 2020

The base of the Berriasian, representing the base of the Cretaceous, was the last remaining System boundary to lack a GSSP. A new WG had been set up to address the impasse that had been reached by the previous WG with no progress towards establishment of a GSSP.

The new WG is making swift progress. Three options for placing the boundary were considered: 1) moving the boundary downward into the traditional top Tithonian to the M19r/M20n1r Chron boundary (base *Crassicollaria* Zone, base *Cr. intermedia* Subzone, base NJT17 (*N. globulus minor* nannozone); 2) placing the boundary at the calpionellid 'Alpina' nannofossil event; 3) placing the boundary higher, in the traditional 'mid-Berriasian', between base M17r and base M16r (base *C. elliptica* Subzone, base *S. occitanica* Zone, base Ryazanian, prominent climate event).

The 'Alpina event', a level promoted by members of the previous WG, was rejected. This was an ill-defined acme level not a LO or HO of a taxon. Independent specialists were unable to provide consistent placement of the level in sections. The level would potentially be highly diachronous if employed as a primary GSSP criterion.

Selection of a high 'upper Tithonian' level of the magnetic reversal was favoured, with a clear majority of votes by WG members during 2 voting rounds. The chosen level approximates to the Portland / Purbeck boundary traditionally adopted in the UK, with a small offset. It corresponded to a major aridification event and marked marine regression. Many fossil groups underwent rapid evolution at this time and offered potential secondary levels. Radiolaria were being re-investigated.

Sections at Torre de Busi in the Lombardy Basin (currently most favoured) and the Bosso Valley of the Apennine Basin, Italy, are being considered as potential GSSPs. A SABS in the Neuquén Basin of Argentina is likely. A special issue of Cretaceous Research is planned to publish results of new studies on the stratigraphy of the candidate sites, see https://www.sciencedirect.com/journal/cretaceous-research/about/call-for-papers#jurassic-cretaceous-boundary-interval-global-correlation-and-palaeoenvironmental-background. These would guide final site selection.

Additional work is still required, with boundary criteria and sites to be further evaluated in 2024 – 2025. A proposal was projected to be completed within 2 years.

Aptian WG, Chairs Helmi Weissert and Elisabetta Erba – appointed 2016, exceptionally reconvened by Chair Petrizzo for 1 additional term due to imminent completion of work.

Elisabetta Erba reported that the base of the stage had been informally taken at the base of the M0 magnetic Chron for the last 20 years. This was now rejected due to new ammonite records and difficulties in placing the magnetic reversal in key sections.

Steady progress had been made by the WG on redefinition of the base Aptian. The negative carbon isotope excursion associated with OAE1a has been selected to provide the primary marker – the onset of the major negative CIE identified at the C2/C3 boundary in all carbon archives, with secondary criteria provided by ammonites, planktonic foraminifera, calcareous nannofossils, other biostratigraphic data, and magnetostratigraphy.

Selection of a GSSP at Cau, SE Spain, was agreed following two rounds of voting. Five sites were considered in Round 1 with the following votes: Cismon, Italy (13 votes), Gorgo a Cerbara, Italy (7 votes), La Bedoule, France (6 votes), Cau, Spain (13 votes), El Pui, Spain (9 votes). In Round 2 the two sites with the largest number of votes, Cau and Cismon received 17 and 9 votes, respectively. Cau was accordingly selected as the candidate GSSP.

High-quality core and adjacent outcrop sections are available from Cau with highest resolution data obtained to date from the core (Castro et al., 2021). Core was archived at Jaén University, Spain. Selection of the outcrop as the GSSP was preferred. Cismon and potentially other sites were to be considered for inclusion as SABS in the GSSP proposal.

A proposal is currently being written by WG members. Completion by end 2024 is expected.

Maastrichtian WG, Chair Silke Voigt – appointed 2022

The current GSSP definition, ratified in 2001, was based on the level of an arithmetic mean of 12 biostratigraphic marker levels in the Tercis les Bains section of SW France, and most closely approximated by the LO of the ammonite *Pachydiscus neubergicus*. No primary marker had been designated. The LO of the marker ammonite was now known to be highly diachronous. Its position in the stratotype was likely not a FAD. Biostratigraphic markers were compromised by poor preservation of calcareous fossils and included HOs that also displayed inconsistent levels in multiple study sections. No magnetostratigraphy was available. The current definition of the boundary level was unacceptable.

New research during the last 15 years (e.g. Voigt et al., 2010, 2012) had established a coherent carbonate carbon isotope stratigraphy spanning the Campanian – Maastrichtian

boundary, the CMBE, at Tercis and elsewhere. This included 5 levels, CMBE 1 – 5, that had been recognized at multiple sites in Europe and in deep-sea cores from the major ocean basins. Carbon isotope stratigraphy offered potential to establish a primary marker, e.g. the base of CMBE4 which is close to the base of Chron 31r, for defining the stage boundary.

The new WG chaired by Silke Voigt is undertaking a detailed re-examination of the stratigraphy in the GSSP section at Tercis les Bains. A new high-resolution carbonate C isotope curve has recently been completed along with a cyclostratigraphic analysis of the stable isotope, magnetic susceptibility and XRF elemental records. A coherent cyclostratigraphic signal has been extracted from the proxy time series that enabled potential correlation to previously studied Campanian – Maastrichtian boundary sections at Bidart, Sopela and Zumaia that had precise microfossil event data. Correlation would enable calibration of the CMBEs to astronomical time scales. This work is in progress.

Biostratigraphic work on Tercis is proving challenging. Extraction of carbonate microfossils and nannofossils was difficult due to silicification of the sediments. Poor preservation of extracted material compromised accurate biostratigraphic determinations. Acetic acid methods had proven unsuccessful. Other extraction methods are to be assessed. Palynological studies are in progress with samples currently being processed.

Additional reappraisal of the GSSP and comparison to alternative boundary sections is in progress.

Planning for the future and conclusions

Priority should be approval of the Valanginian GSSP proposal and ratification of the section, submission of an Aptian GSSP proposal with subsequent approval and ratification, the selection and ratification of a Berriasian GSSP, and revision of the Maastrichtian stage boundary criteria.

The establishment of formal Cretaceous substages should be considered, particularly for the longer stages such as the Albian and Campanian. Informal substages were already in wide use but were commonly inadequately defined in publications and are generally inconsistent, resulting in potential for miscorrelation and misinterpretation of data. Substage WGs should be established to progress the subdivision of major intervals of Cretaceous time.

Consideration should be given to the identification and formal adoption of SABS or additional SABS for ratified stages.

Correlation between marine Cretaceous and non-marine records should be pursued with the potential establishment of non-marine SABS.

Any other business

Maria Rose Petrizzo stated that she had greatly enjoyed her 8 years as Chair of the Subcommission and had made many new friends and colleagues during her tenure. She thanked all the WG members that had worked so hard to progress the definition of Cretaceous stages. She looked forward to continued collaboration with the community in the future as voting member.

Vice-chair Michael Wagreich thanked Maria Rose and the Subcommission members for 12 great years of work on the Cretaceous and he will be happy to collaborate and contribute to the Subcommission objectives as corresponding member.

The new chair Ian Jarvis thanked Maria Rose for her sterling work over the last 8 years. The results had been exemplary and were widely recognised within the ISC. Maria Rose would be a hard act to follow but he would do his best to continue to champion Cretaceous stratigraphy. Stratigraphy underpinned all soft rock geology but currently received insufficient recognition by many geoscientists, industry, and funding bodies. Nonetheless, improvements in stratigraphic resolution and correlation were essential to progress many areas in the geosciences. This would be the aim of the Subcommission.