

MINUTES OF COMMISSION I

General Coal and Organic Petrology

67th ICCP Meeting, Potsdam, Germany, 7th-8th September 2015

Chair: Deolinda Flores, dflores@fc.up.pt, Secretary: Stavros Kalaitzidis, skalait@upatras.gr

Opening remarks

The Commission I meeting was held on the afternoon of Monday the 7th and the morning of Tuesday the 8th of September and was attended by 49 and 53 members, respectively. The Chair outlined the programme for the sessions and presented a short overview of the Commission's activities during the last year.

Deolinda informed the attendees that Thomas Gentzis the Convenor of the Reflectance & Terminology of Zooclasts in old sediments WG sends his apologies for not attending the Meeting.

Temporal Variations in Coal WG – Lopo Vasconcelos

Although this WG is not active any more, Lopo continues to add new data into the database, which now reaches in total 12,743 maceral data entries from 76 countries and territories (22 “Gondwana” and 54 “North Atlantic” countries/territories). **ICCP Members are encouraged to use the Database that is loaded on the ICCP webpage (<http://www.iccop.org/workinggroup/temporal-variation-of-coals/>) and/or to add any new data that become available by conducting either Lopo or Com I Chair/Secretary.**

Commission's I sessions included a Microscope Session and presentations of the following WG's:

- SCAP - Single Coal Accreditation Program
- Suberinite Working Group
- Standardization Working Group
- ISO Standard
- Micro-FTIR Working Group
- Distinguishing Features of Macerals Editorial Group
- New Methodologies and techniques in Organic Petrology Editorial Group
- New Handbook Editorial Group
- TEM, SEM and Pyrolytic Carbon Editorial Group

- QEMSCAN Editorial Group
- Raman Spectroscopy Editorial Group
- Liptinite Editorial Group
- Oxidation Editorial Group
- Petrographic Image Database
- Additionally, although not a WG Carl Hilgers presented the New Enhancements of Fossil Measurement System.

Single Coal Accreditation Program - Kimon Christanis

Kimon presented the report of the 2014 SCAP round, along with a short review of the SCAP exercises since 2006.

The 2014 SCAP exercise was announced in February 2014. Participants have electronically registered *via* ICCP webpage. Dispatch of invoices, samples and instructions has begun in April 2014. In the past exercises, beginners received six block samples and continuing participants two bulk coal samples. However, in the 2014 exercise only nine beginners received blocks as (a) most of the blocks have been lost in the post and (b) for the first time the SCAP sample bank was able supplying the participants with bulk samples. The participants had to measure the following parameters:

- Vitritinite random reflectance (VR) according to ISO 7404-5 measured on collotelinitite (ICCP, 1998).
- Vitritinite content (VC) according to ISO 7404-3.

The initial deadline to submit the results was end of September 2014.

In total 117 analysts were registered in the 2014 SCAP from 67 laboratories located in 20 countries. About 112 analysts sent VR and 108 analysts sent VC results. Eighty-six of the 2012 participants continued the exercise in 2014, whereas 26 were new entries, which is very encouraging. It is interesting to note that 54 participants are members of ICCP, whereas 58 are non-members.

The geographic (concerning continents) distribution of the participants was: Oceania 36%, Europe 32%, America 18%, Africa 10% and Asia 4%.

There are some differences in the 2014 Round in comparison to the previous ones. The Screening Method for Beginners (SMB) was extended to all the participants analysing six coals. In case of values $> 3SD$, the higher values are truncated at $3SD$ in the database.

VR accreditation was awarded to 106 (out of 112) participants and VC to 101 (out of 108) participants. Two participants failed in both VR and VC.

For this round three appeals were received, from which two were rejected, as the failures were due to wrong reporting of results and wrong values, and the one was accepted as the issue was one wrongly marked sample.

One main problem remains the loss of samples as they are possibly confiscated by customs around the globe; this resulted in the loss of the block samples but also significant delays in the procedure and additional postage expenses. The loss of certificates in the post is another severe problem resulting in delays and additional expenses. This year many certificates were returned to sender undelivered. Maybe the ASC has to examine the possibility to send electronic certificates.

Moreover, Kimon mentioned that due to the increased assessment complexity, it is necessary to get software to handle SCAP data, based on the experience of the CBAP. Deolinda will contact INTERRELATE company to request for quotation for the development of an Excel-based application for the evaluation of SCAP data.

The next round will begin in February 2016 with announcement and registration with September 2016 being the deadline for results submission. All the participants will be receiving bulk samples.

Finally, Kimon expressed the interest to move to an Accreditation Programme for low-rank coals in the near future. It was agreed that as an initial step, this will be explored within the Standardization WG.

Kimon acknowledged the support by the ASC members, Deolinda, Paul, Magda, and Paddy, Jen for her logistic support, Gisela and Gerd, as well as by his students Görkem, Maria-Elli and Constadis for assisting in this round.

However, the SCAP program requires additional samples; **Hence Members who can supply with suitable bulk, single coal samples, please contact Kimon: christan@upatras.gr.**

Commission I thanks Kimon for all his efforts in convening the SCAP.

Suberinite WG – Peter Crosdale & Antonis Bouzinos

Peter Crosdale continued the presentation of the Suberinite WG and provided a short overview of the planned 2015 exercise.

The problematic key issues in suberinite identification were discussed also during the Microscope Session.

Photomicrographs from the new exercise, with elevated difficulty, were presented and discussed and it was evident that structure is a key element for many members in discriminating among suberinite and bituminite and/or liptodetrinite.

The new exercise consists of 40 photomicrographs, taken using both black & white and colour cameras, as well as under fluorescence mode; additionally the images are annotated with reflectance values. The participants should identify the marked macerals and also comment, in the cases of suberinite, if they represent “typical suberinite” according to the existed ICCP classification. Twenty one members expressed their interest to perform the exercise.

All the relative documentation of the WG is available on the ICCP webpage, along with the files of the 2015 Exercise (<http://www.iccop.org/workinggroup/suberinite>).

Anyone interested in participating in the new exercise please contact Peter (peter.crosdale@energyrc.com.au).

Commission I thanks Peter and Antonis for convening this very interesting WG.

Standardization WG – Walter Pickel

Walter Pickel presented a very short report from the continuation of the 2010 Standardization Exercise, according to which the participants had to report the maceral-subgroups of the vitrinite group. Previous reports, as well as the exercise files are located in the ICCP webpage (<http://www.iccop.org/workinggroup/standardization>).

This year an email was sent to all the ICCP Members to conduct the exercise, however only 3 members responded, and their results were similar to the already received.

Walter will compile a final report of this exercise and submit to Commission I.

Some key points that he commented on as conclusions from the round robin results are:

- *It is standard practice to distinguish between Telovitrinite and Detrovitrinite in order to choose telovitrinite as the maceral sub-group on which routinely vitrinite reflectance is determined.*
- *In maceral, maceral group or sub-group analysis care should be taken, especially when results from different analysts or laboratories are compared.*

The Distinguishing Features of Macerals EG will aim to provide additional information in assisting with the distinction between different macerals, hopefully also to assist in the distinction between the vitrinite maceral sub-groups.

Finally, it was agreed that a new Standardization WG Round Robin exercise will be prepared on lignite samples in order to check the possibility of an Accreditation Program for low rank coals or the addition of low rank coals to the existing SCAP program.

Commission I thanks and congratulates Walter for his dedication conducting the Standardization round robin exercises.

ISO Standard – Walter Pickel

Walter discussed the status of the “ISO 7404 Methods for the petrographic analysis of coal” revision. Three parts (2, 3 and 5) have been revised and published by ISO. The chapter ISO “7404-1 Vocabulary” has been revised during 2014 by W. Pickel, P. Hackley, P. Crosdale, I. Suárez-Ruiz, S. Kalaitzidis, J. Potter and, Shifeng Dai on behalf of the ICCP and is now with ISO Committees.

During 2015 the Group revised the Part 4 - Method of determining microlithotype, carbominerite and minerite composition, and the documents are with ISO.

During the discussion suggestions were made for changes in Table 2:

- add the names of maceral groups for the Trimacerite microlithotype,
- rephrase to allow for one intersection to be recorded.

Commission I thanks Walter and the WG participants for their efforts in delivering the ISO Standard.

Distinguishing Features of Macerals EG – Walter Pickel

Walter presented the aim of the WG, which is to “*compile criteria that will add more detail to the ICCP 1994 maceral classification and thus support analysts in maceral identification*”. The intention is to add detail in the framework of the existing definitions to assist analyst with further distinguishing features of the macerals they want to identify.

He presented draft texts for several macerals from all the maceral groups. This text will be circulated among the 21 members, who expressed their interest to participate with comments

and additions. A draft version of this compilation will be presented at the next ICCP meeting in Houston.

Commission I thanks Walter for his efforts.

New Methodologies and Techniques in Organic Petrology WG- Lila Gurba

Lila presented an overview of the **Handbook of Instrumental Techniques Applied in Coal and Organic Petrology: Electron Microprobe** Chapter. She discussed the status of the Handbook, how Electron Microprobe techniques can contribute to Organic Petrology studies and summarised with recommendations for future directions.

The Handbook is structured as follows:

- Part I: The instrument (capabilities, limitations, development of analytical protocols, standards etc.).
- Part II: Coal macerals and source rocks studies using EMA
- References
- Recommendations to ICCP

The main outcome is that EM studies can add value to update the ICCP classifications by providing elemental composition of the various macerals.

Lila will provide the Handbook soon to be available on the ICCP webpage for comments.

Lila also presented a new methodology as part of the Handbook of Instrumental Techniques Applied in Coal and Organic Petrology. The title of the presentation was **X-ray Computed Tomography (Micro-CT)**, and the study is in collaboration with Prof. Christoph Arns from University of New South Wales, Sydney Australia. She discussed the principles and the significance of this application and provided examples on how we can get value by implementing the technique. Main applications could include the studies of shale properties, CO₂ sequestration studies, as well as characterization of coal microstructure and porosity. The presentation is available on ICCP webpage.

Commission I encourages members to present within this WG research summaries in the broader field of coal science, in which organic petrography could be a significant input. Interested parties please contact Lila (l.gurba@unsw.edu.au) during the year.

Commission I thanks Lila for her ideas and efforts in this WG.

Micro-FTIR WG - K.L Jin, Y.G Tang, S.Q Wang & L Zhao.

Shaoqing Wang presented the activities of the WG in a study entitled “**The Micro-FTIR characteristics of different ranks and macerals in coal**”. In his presentation he outlined the Micro-FTIR experimental set up, the results and the problems they faced with the analyses, as well as the future work that needs to be completed. The aims of the WG are to apply Micro-FTIR on coal studies and to standardize the different existing methodologies. The study included the analyses of 10 coal samples from China with VR ranging from 0.32 to 3.81%. The main outcome was the characterization of structural parameters (e.g. CH₂/CH₃ ratio) of vitrinite, sporinite, and fusinite using a curve-fitting routine by PeakFit software.

Problems that the group has to overcome are the limited representation of liptinite macerals in the studied samples and the option to perform also quantitative analyses.

For next year the plan is to continue with more analyses on different ranks and coal types.

During the discussion it was agreed that the Convenors will communicate with the interested members to exchange samples and results, so that comparable conclusions can be obtained, towards standardisation of the optimum experimental set up. In total 11 members expressed their interest to participate in the exercise.

Commission I thanks Shaoqing and his colleagues for their efforts in this very interesting WG.

New Handbook Editorial Group – Ivana Sýkorová, Isabel Suárez Ruiz & Kimon Christanis
Deolinda and Kimon presented a short history of the development and the status of the New Handbook. For this year the Chapters Pyrolytic carbon, TEM microscopy, SEM microscopy and Oxidation were finalised by the respective Editorial Groups, as described in more detail in the relevant paragraphs below.

Other chapters are ready (*see* ICCP News 2015, vol. 61, p.16), which need to be formatted in a uniform layout. Ivana Sýkorová will also provide the Huminite (Chapter 5.2) and Vitrinite (Chapter 5.1) in the Handbook layout. Due to technical issues the already finalised chapters were not available on the webpage to the members; however a new module will be created to host the Handbook Chapters on the webpage.

Remaining chapters in progress that require extensive revision and edits are: Introduction (Chapter 1), Microlithotypes (Chapter 4), Classification of DOM (Chapter 6), Methods

(Chapter 7), Coal Utilisation (Chapter 8), Other terms (Chapter 9), ICCP services (Chapter 10). The Editorial Group seeks for volunteers to assist with finalizing these Chapters.

During the discussion Petra David suggested to scan and publish on the ICCP webpage the old Handbook version, and Commission I will act on this during the year.

It was also discussed that ICCP should seek advice on how to publish in peer review journals parts of the Handbook that various Editorial Groups prepared, so that ICCP will retain or share the Copyright.

The EG is also pleased because Petra David re-joined the Group.

Commission I thanks Isabel, Ivana and Kimon for their efforts on publishing the Handbook, as well as all the valuable reviewers that help to improve the manuscripts prepared by the conveners.

TEM, SEM and Pyrolytic Carbon Editorial Group – Barbara Kwienicka & Sławomira Pusz

Sławomira presented the final text of the TEM, SEM and Pyrolytic Carbon chapters. The manuscripts were reviewed by at least 2 reviewers the previous years and were uploaded on ICCP web page in 2015 for the final review and commenting phase by ICCP members. The manuscripts and the references were revised according to the comments received and formatted according to the Handbook layout.

During the meeting there was a suggestion to add colour photos of pyrolytic carbon and Sławomira will act on this.

The final manuscripts were presented and approved unanimously by the Commission I Members in Tuesday's Session.

It was also approved that the approved manuscripts will be published in peer-review journals in a different format under share copyright, something that ICCP Council will handle.

Commission I congratulates Barbara and Sławomira for their excellent work.

QEMSCAN Editorial Group - Sandra Rodrigues & Joan Esterle

Sandra presented the draft manuscript "Quantitative Evaluation of Minerals by Scanning Electron Microscopy (QEMSCAN)" by Sandra Rodrigues, Joan Esterle, Rogério Kwitko-Ribeiro, Leonardo Salazar and Patricio Jaime.

QEMSCAN (Quantitative Evaluation of Minerals by Scanning Electron Microscopy) is a fully automated microanalysis system that allows quantitative chemical analysis of materials and generation of high-resolution mineral maps and images as well as porosity structure. It can be applied to the study on mineral matter in coal and characterization of organic matter host rocks.

The draft document included the following chapters:

- Overview: describing the technology and the applications in geological fields.
- Sample preparation: detailing the various forms of samples that can be analysed.
- Analytical protocols: describing the basic elements of QEMSCAN instrumentation.
- Measurement protocols: describing the software used for data acquisition.
- Classification protocols: describing the software used for data processing and interpretation.
- Outputs: detailing the various output formats (i.e. images, graphs, tables either based on mineralogy or elemental quantification).
- References.

At this stage Commission I will seek two reviewers to review the manuscripts for within 2015 and then they will be uploaded on ICCP webpage for the final revision phase by ICCP Members.

Commission I would like to thank Sandra for her presentation as well as all the contributors for this useful addition.

Raman Spectroscopy Editorial Group - Barbara Kwieci ska & Sandra Rodrigues

Sandra presented also a draft text of the Raman Spectroscopy Chapter for the New Handbook.

The draft document included the following Chapters:

- Overview: describing the method and the applications in geological fields.
- Raman spectrum in carbon-based materials: describing the method in carbon materials.
- Sample preparation: detailing the various forms of samples that can be analysed.
- Analytical protocols: describing the basic elements of Micro-Raman spectroscopy.
- Measurement protocols: describing the setup of the software parameters for the acquisition of the data.

- Classification protocols: in progress.
- Outputs: in progress.
- References: in progress.

The EG will finalise the manuscript in 2016 and will deliver it to Commission I for the review phase.

Commission I would like to thank Sandra and Barbara for their efforts in delivering this very useful addition to the New Handbook.

Liptinite Editorial Group – Walter Pickel, Jolanta Kus & Peter Crosdale

Walter presented the manuscript of the Liptinite sheets along with the photomicrographs that were selected. The Liptinite chapter was delivered to Commission I and was uploaded on the webpage in July 2015 for ICCP Members to review. Hard copies were also delivered during the Meeting so that members had the chance to review it.

Several members provided with comments that were incorporated into the text.

A final version was delivered during the GA on Thursday the 10th and the manuscript was put to voting. From 44 present members, 43 voted in favour and 1 against, hence the Liptinite sheets manuscript was approved.

It will be formatted according to the New Handbook layout and also will be submitted for publication to a peer review journal under a share copyright scheme.

The final version is available on the ICCP webpage (<http://www.iccop.org/workinggroup/liptinite>).

Commission I congratulates Walter, Jolanta and Peter for their work on the Liptinite chapter.

Oxidation Editorial Group – Jolanta Kus & Magdalena Misz-Kennan

Jolanta presented the final text of the Oxidation Chapter, which is structured in 9 chapters. The Manuscript was uploaded on ICCP webpage and members were informed by email to revise it during the year.

Six members, Brett Valentine, Brian Cardott, Walter Pickel, Nikki Wagner, Stavros Kalaitzidis and Ivana Sýkorová sent their comments by January 2015.

The final manuscript includes 13 plates of photomicrographs from weathered coals.

The final manuscript was presented and Commission I members approved it unanimously.

The EG will format the manuscript according to the New Handbook layout and also will seek to publish it in a peer review journal under a share copyright scheme.

Commission I congratulates Jolanta and Magda for their work on the Oxidation Chapter.

Petrographic Image database - Johan Joubert, Paddy Ranasinghe & Paul Hackley

Unfortunately the petrographic image database didn't progress during 2015.

However, Paul Hackley presented a short overview of the **USGS Organic Petrology Photomicrograph Web Atlas**, which can be found at <http://energy.usgs.gov/Coal/OrganicPetrology/PhotomicrographAtlas/ASTMCoalMaceralClassification.aspx>.

During the Meeting it was decided that Petra David will convene the WG with Paul, Paddy and Stavros being part of it.

Silk Tech S.A. will be conducted to explore the options to develop the required software and to incorporate the image database on the ICCP webpage.

Commission I realises the need to develop the Image Database and is dedicated to initiate this task within 2016.

Enhancements of Fossil Measurement System - Carl Hilgers

Carl presented an overview of the Fossil System and its development history. The main principle is the utilization of monochromatic camera as a photometric sensor and that reflectance can be measured at any point of the observation field and not only under the cross-hair. The new additions on the reflectance measurement software include:

- Focus with stacked images (Z-stack) in reflected white light and fluorescence images.
- Fast auto-focus, which allows for quick scanning of many images.
- Automatic detection of sample homogeneity during the scan.
- Measurement of maximum reflectance either with rotating stage or automated maximum reflectance with motorized polarizer.

The most recent developments include:

- The option to perform reflectance and fluorescence intensity measurements using a Zeiss spectrometer.
- The release of the Fossil “Light” software version.

Carl also presented a series of photomicrographs taken with the Fossil Measurement System as well as he demonstrated a “live” reflectance measurement of a coal sample.

Commission I thanks Carl for his efforts in developing useful tools for organic petrographical studies and for his enormous support in our activities.

Microscope session

Commissions I, II and III held a joint microscope session on Tuesday the 8th at 14:30-17:30. Peter Crosdale discussed photomicrographs of the new Suberinite WG exercise. The attendees had to identify suberinite in samples from Surat Basin, Australia. The attendees discussed the features of the suberinite and its association or not to corpogelinite, as well as the differences between “*dark vitrinite*” and “*possible suberinite*”. The Suberinite WG will definitely provide useful conclusions that could be used by the Distinguishing Features EG an/or in future amendments of the definitions.

Additionally Peter presented Australian Permian coals of high rank ranging in VR between 2.5-5% and interesting discussions were achieved regarding the identification of different macerals in this rank range. Particularly of interest was the differentiation between telo- and detrovitrinite, as well as between vitrinite and semi-fusinite.

Magdalena Misz-Kennan also discussed during the session the photomicrographs of the Self Heating WG, as in several of the images the agreement was low.

Commissions I, II and III would like to thank Peter, Magda and Carl Hilgers, who provided the microscopic facilities, for their contribution in this successful session.

Xylite-rich Lithotype Classification WG – Yiannis Oikonomopoulos

Yiannis Oikonomopoulos proposed a new WG under Commission I, with the objective to develop a Classification scheme for Xylite-rich lithotypes of low-rank coals. Stavros presented the preliminary working plan, according to the ICCP check-list, on behalf of Yiannis during the short-report session of Commission I on Thursday’s General Assembly.

For the first 2 years the working plan will be as follows:

- Detailed review of the existing literature on xylite-rich coals.
- Collection of new data concerning various “xylite” types that occur in xylite-rich lignite deposits in Eastern Europe and Asia.
- Contribution to the ICCP database with photomicrographs of woody materials.
- Adding to the existing nomenclature.
- Propose a new classification system to the ICCP.

Sixteen members expressed their interest to participate in the activities of this WG.

The plan was approved by the members and Commission I welcomes this new WG and thanks Yiannis for his initiative.

Closing Remarks

Deolinda Flores and Stavros Kalaitzidis closed the Session of Commission I.

ICCP Members were reminded that the following Commission I Services are available for the Coal Petrography Community:

Single Coal Accreditation Program, SCAP – Kimon Christanis (christan@upatras.gr).

Reflectance Standard Checking: The service to check standards against the *ICCP Reflectance Standard* continues available from Dave Pearson, Walter Pickel and Gred Bieg (USD 50 and free for ICCP members).

As per final remarks Commission I would like to encourage ICCP members to visit the webpage, since a lot of data and information from the WGs have been uploaded <http://www.iccop.org/commissions/commission-i/>.

The presentations of the Meeting are also available in the secure area of the webpage, and the convenors of the various WGs are encouraged to check and update regularly the web material.

Finally, Commission I would like to thank all the participants of the sessions for their active participation that resulted in another productive Meeting.