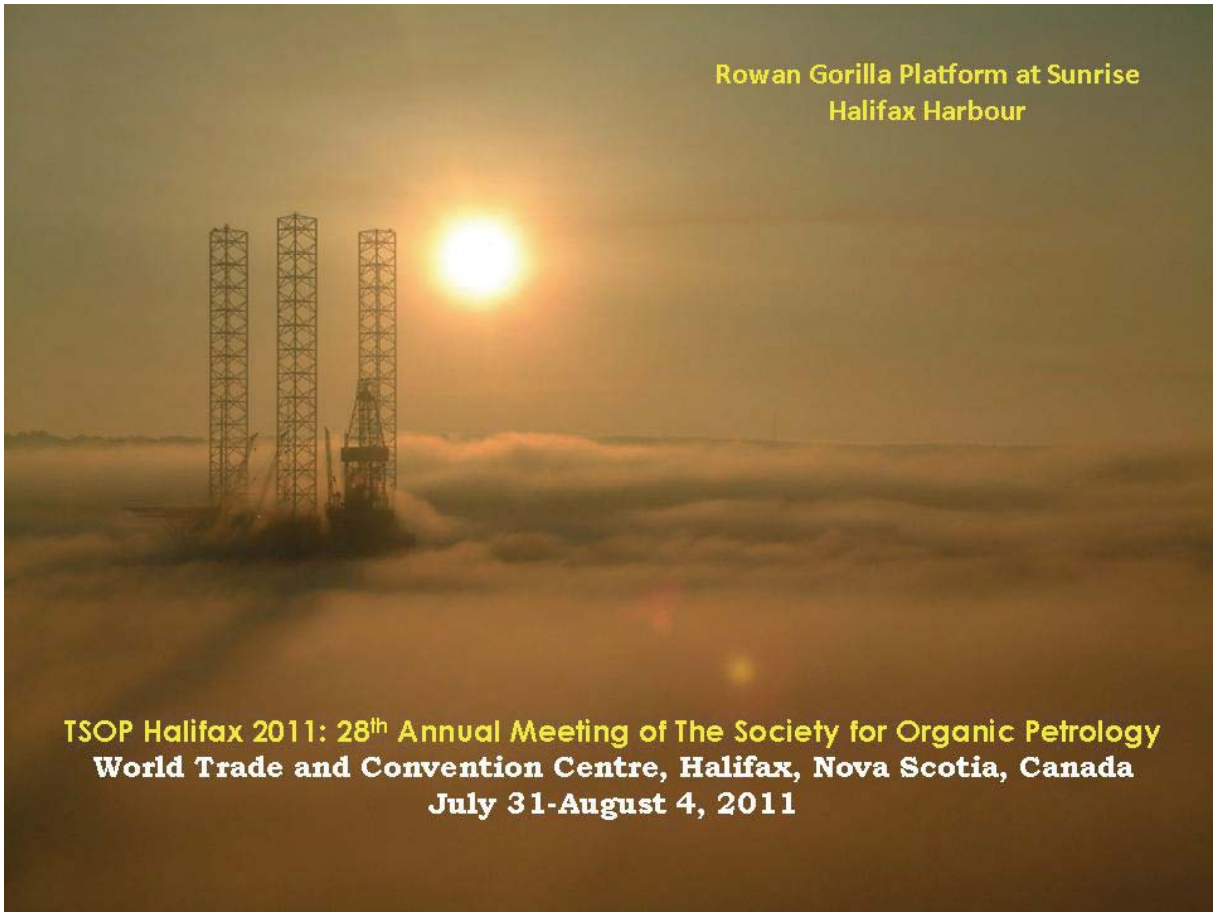
THE SOCIETY FOR ORGANIC PETROLOGY

NEWSLETTER

Vol. 28, No. 2 June, 2011 ISSN 0743-3816

28th TSOP ANNUAL MEETING
July 31 – August 4, 2011
Halifax, Nova Scotia
Canada



Conference Theme:
"Energy Resources and Petroleum Systems in the 21st Century"

TSOP 28th Annual Meeting

See pages 16-23

Meeting website:

www.tsop.org/2011Halifax or www.tsop.org/TSOP-Halifax2011

Deadline for Abstracts has passed. See list of talks on page 20.

Schedule

Short course - Sunday, July 31.
"Shale Gas Geochemistry" – Dan Jarvie
"Shale Gas Modeling" – Thomas Hantschel

Technical sessions
Monday, August 1st - Day 1: 8:30am - 5:30pm *(with 2 hr noon break for TSOP Business Luncheon)*
"Petroleum Systems and Evaluation of the Unconventional Resources (Shale Gas or Shale Oil, Coal Bed Methane and Gas Hydrates)"
TSOP-CSCOP 2011 Banquet (7:30-10:00)

Technical sessions
Tuesday, August 2 - Day 2 (Two concurrent sessions: *8:30 - 5:30 with 1 1/2 hr break at noon*)
Session 1. "Petroleum Systems and Evaluation of the Unconventional/Conventional Resources (Shale Gas or Shale Oil, Coal Bed Methane and Gas Hydrate)"
Session 2. "CO_2 Sequestration and Other Environmental Issues related to Coal and Petroleum Use"

Field trip - Wednesday, August 3rd & Thursday, August 4th
Day 1: Mississippian fluvial and lacustrine outcrops and shale gas evaluation in Elgin and Moncton Subbasins (with a possible visit to recent shale gas development site)
Day 2: Pennsylvanian fluvial and coal successions, Joggins Fossil Cliffs World Heritage Site & Fossil Museum, Bay of Fundy, Joggins, Nova Scotia.

TSOP Council Meetings – Prince George Boardroom (ask for directions)
Outgoing – Saturday, July 30th, 5:00pm – 8:00pm
Incoming – Monday, August 1st, 5:00pm – 6:30pm

The Society for Organic Petrology

TSOP is a society for scientists and engineers involved with coal petrology, kerogen petrology, organic geochemistry and related disciplines. The Society organizes an annual technical meeting, other meetings, and field trips; sponsors research projects; provides funding for graduate students; and publishes a web site, this quarterly Newsletter, a membership directory, annual meeting program and abstracts, and special publications.

Members may elect not to receive the printed Newsletter by marking their dues forms or by contacting the Editor. This choice may also be reversed at any time, or specific printed Newsletters may be requested.

Members are eligible for **discounted subscriptions** to the Elsevier journals *International Journal of Coal Geology* and *Review of Palaeobotany and Palynology*. Subscribe by checking the box on your dues form, or using the form at www.tsop.org. You will then be billed by Elsevier. Contact Paul Hackley <phackley@usgs.gov>if you do not receive a bill or have any other problems with a subscription. For the best prices on subscriptions to **AGI**'s ***Geotimes***, see their web site at www.geotimes.org/current

TSOP is a Member Society of AGI and an AAPG Associated Society

The Society for Organic Petrology Newsletter

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DEADLINES: Sept. Issue: Sept. 10th, 2011
Dec. Issue: Dec. 10th, 2011

Writers, Photographers and Associate Editors Needed!

GUIDELINES:

The TSOP Newsletter welcomes contributions from members and non-members alike. Readers are invited to submit items pertinent to TSOP members' fields of study. These might include meeting reports and reviews, book reviews, short technical contributions including those on geologic localities or laboratory methods, as well as creative works such as poems, cartoons and works of fiction. Photos, graphs and other illustrations are welcomed. Low-resolution images are discouraged, as they cannot be reproduced well in print. Articles are preferred in Microsoft Word, RTF or plain text formats.

Contact the **Editor:**

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Address Changes

Please report any changes in address or contact information to: Paul Hackley, TSOP Membership Chair, phackley@usgs.gov

Members can update their own information by logging into the secure TSOP website: www.tsop.org/mbrsonly/

Society Membership

The TSOP Newsletter (ISSN-0743-3816) is published quarterly by The Society for Organic Petrology and is distributed to all Society members as a benefit of membership. Membership in the Society is open to all individuals involved in the fields of organic petrology and organic geochemistry. For more information on membership and Society activities, please see:

www.tsop.org

For purposes of registration of the TSOP Newsletter, a permanent address is: The Society for Organic Petrology, c/o American Geological Institute, 4220 King St., Alexandria, VA 22302-1520 USA

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Institutional Level Dues Supporter

On behalf of TSOP Council we would like to say thank you to the following Institutional Level Dues Supporter for their consistent support of the Society and its goals.

- Albert V. Tamashausky, Asbury Graphite Mills

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Another Chance for Newsletter Back Issues

By David Glick

TSOP has in stock many issues of paper copies of old Newsletters; with some additional reprinting, a few full sets of back issues can be assembled. TSOP is making available a limited number of sets at no charge. Individual issues may also be available. Libraries will be given first choice, but interested TSOP members may also submit requests. All should remember that electronic versions are available on the web site; it should be verified before making a request that a library does want paper copies (a full set occupies approximately 4 inches / 10 cm of shelf space). Please contact David Glick now at <**webmaster@tsop.org**>.

Volunteers Requested for Web Site Features

By David Glick

The Internet Committee would welcome your help in expanding the features and content of the TSOP web site. With the proper assistance, we might undertake: a discussion forum (outside the web site, such as Yahoo! Groups, or within the site); a searchable index; investigation of software such as Zotero for an actual database to organize the literature references; more photograph galleries; more work on the In Memoriam section.

A photo gallery module is part of the site; it can display up to 14 images, with captions. If anyone would like to provide such a set of photographs that relates to some TSOP topic or activity, I would be happy to have them. Please remember to include captions and the name of the photographer.

Please contact me at <**webmaster@tsop.org**> if you would like to work on any of these, or anything else to expand or improve the web site.

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New TSOP Members

Bree Rees

Ms. Rees completed her undergraduate degree in geology in 2011 at the University of Regina. She has worked two summers in coal exploration and is currently pursuing an MSc in organic geochemistry at the University supervised by Dr. Stephen Bend.

Mohammed Chaanda

Mr. Chaanda completed his BSc in geology in 1997, MSc in mineral exploration and economic geology in 2004 and currently is engaged in PhD studies in geological sciences at the University of Plymouth, United Kingdom. His interests include source rock evaluation, coal petrology, and biomarker analysis.

Melissa Freeman

Ms. Freeman is pursuing a MSc degree in geology at the University of Calgary where she completed her BSc in geology with 1st class honors. Her interests include petroleum geochemistry and unconventional energy resources.

Carol Butland – welcome back!

Ms. Butland is pursuing her PhD studies in shale gas reservoir characterization at the University of Western Australia. She holds BSc (2001) and MSc (2006) degrees in geology from the University of Canterbury and has worked for industry in coal and coalbed gas exploration. She previously attended the 2005 TSOP meeting in Louisville, Kentucky, where she presented her work on characterization of New Zealand coalbed gas resources.

Catherine Donohue

Ms. Donohue is employed in industry where her interests include petroleum geology and geochemistry. She holds an MSc in Earth Science from Rice University.

Mohammad Wahid Rahman

Mr. Rahman earned MS degrees in Geology from Dhaka University, Bangladesh, in 2006 and Auburn University in 2008. Currently, he is pursuing PhD studies focused on organic petrology and geochemistry of coals, sediments and water at Southern Illinois University in Carbondale under the supervision of Drs. Sue Rimmer and Ken Anderson.

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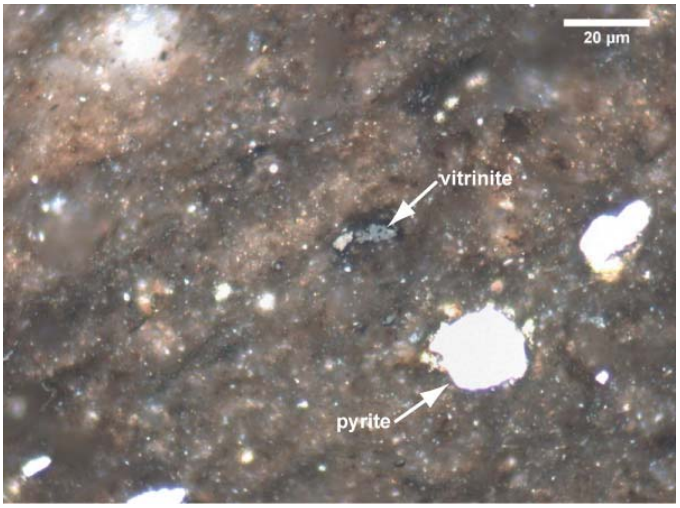
News from ASTM – Reflectance measurement for dispersed vitrinite

A new American Society for Testing and Materials (ASTM) standard test method for measurement of the reflectance of vitrinite dispersed in sedimentary rocks has been developed by an international committee of technical experts from government agencies, academia, industry, and consultancies. This product grew from the efforts of the International Committee for Coal and Organic Petrology (ICCP) Identification of Primary Vitrinite Working Group, and is the result of an international partnership between members of ICCP, ASTM, The American Association of Petroleum Geologists, and TSOP. The new consensus standard is available for purchase from http://www.astm.org/Standards/D7708.htm and is included in the 2011 Annual Book of ASTM Standards, v. 05.06, Gaseous Fuels; Coal and Coke, which can be obtained as a free yearly benefit to ASTM members.

Development of the new test method (ASTM D7708-11) began in 2008 with a survey of common practices used in laboratories that routinely measure the reflectance of dispersed vitrinite in shales. The test method writing committee was identified from among the survey respondents, and the existing ASTM coal vitrinite reflectance standard (ASTM D2798) was used as an outline for the new test method. Significant changes from the coal standard include: 1) specialized terminology to include recycled vitrinite, zooclasts, solid bitumens, and marine algae; 2) discussion of potential for vitrinite suppression and retardation in certain conditions; 3) inclusion of fluorescence observation and resulting changes to equipment description and procedure; and 4) addition of reporting requirements, including type and quality of sample preparation, observation of fluorescence, and consideration of supporting data and information.

The new standard was successfully balloted through the subcommittee and D05 main committee levels of the ASTM vetting process with no negative votes received. However, users of the standard and other interested parties can bring comments and concerns to the attention of ASTM subcommittee D05.28, Petrography of Coal and Coke, which is responsible for the maintenance and revision of this and other ASTM petrography standards. Interested TSOP members who would like to contribute to consensus standards development within subcommittee D05.28 are encouraged to contact Paul Hackley (phackley@usgs.gov) for additional information.

Anticipated users of the new D7708-11 standard include government, academic, and service laboratories. The standard will be used as the prescribed method for the dispersed vitrinite reflectance accreditation program of the ICCP, which currently includes approximately forty laboratories worldwide. The test method is predicted to be most relevant for shale gas plays where precise information concerning thermal maturity is considered key to successful basin analysis. Anticipated future improvements to the standard include the creation of quantified reproducibility and repeatability values through inter-laboratory round-robin exercises, and the development of a supplemental online image atlas of dispersed organic matter in sedimentary rocks to aid in the identification of indigenous vitrinite.



Example of dispersed vitrinite in the Upper Cretaceous Eagle Ford Shale, Maverick Basin, south Texas.

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Applications for 2011 Spackman Awards

A record total of eleven applications have been received for student research grants under the TSOP Spackman Awards program for 2011. These are from students on three different continents, and deal with organic matter in strata from Proterozoic to Recent in age.

An independent panel drawn from senior TSOP members will assess the applications, and the winner (or winners) will be announced at the Annual Meeting of the Society in Halifax later this year.

Colin R. Ward

Chair, TSOP Research Committee

Name	University	Degree	Project
Sarah Brown	Royal Holloway University of London	PhD	The role of fire in dinosaur-dominated terrestrial ecosystems
Ling Gao	Indiana University	PhD	Microbial degradation of organic matter associated with shale gas and coalbed methane in the eastern part of the Illinois Basin (Indiana): implications for biogenic gas potential in Indiana
Jessica Little	University of Tulsa	MSc	Linking source to reservoir using hydrous pyrolysis and diagnostic organic sulphur signatures in the Austin Chalk Formation
Hayley Manners	University of Plymouth	PhD	High-resolution compound-specific carbon isotope study of the PETM in northern Spain
Robin Nagy	Utah State University	PhD	The Late Cryogenian to Ediacaran (ca. 750-542 Ma) microfossil record of the western US
Denet Pernia	University of Houston	MS	Application of open vs closed kerogen isolation methods for spectroscopic and isotopic characterization of gas shale kerogens
Wahid Rahman	Southern Illinois University	PhD	Geochemistry and petrology of thermally altered coals
Sandra Rodrigues	University of Porto	PhD	Microstructural characterisation of coals and graphites for industrial applications
Ivana Stevanovic-Walls	South Dakota School of Mines and Technology	PhD	Geochemistry and computer modelling for oil exploration and production in the Stonewall, Interlake, Souris River, Duperow and Three Forks Formations, Williston Basin, northwestern South Dakota

Jessica Taglieri	University of Melbourne	MSc	Contributions of Cainozoic palynology and brown coal lithotypes to the eastern Victorian Highlands uplift controversy
Elizabeth Williams	Tulane University	PhD	Evaluating chemical diagenesis in deltaic sediments

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Stratigraphic, Microfossil, and Geochemical Analysis of the Neoproterozoic Uinta Mountain Group, Utah: Evidence for a Eutrophication Event?

Dawn Schmidli Hayes
(Spackman Awardee 2009)

Several previous Neoproterozoic microfossil diversity studies yield evidence for a relatively sudden biotic change prior to the first well-constrained Sturtian glaciations. In an event interpreted as a mass extinction of eukaryotic phytoplankton followed by bacterial dominance, diverse assemblages of complex acritarchs are replaced by more uniform assemblages consisting of simple leiosphaerid acritarchs and bacteria. Recent data from the Chuar Group of the Grand Canyon (770-742 Ma) suggest this biotic change was caused by eutrophication rather than the direct effects of Sturtian glaciation; evidence includes total organic carbon increases indicative of increasing primary productivity followed by iron speciation values that suggest sustained water column anoxia.

A new data set (this study) suggests that this same eutrophication event may be recorded in shale units of the formation of Hades Pass and the Red Pine Shale of Utah's Neoproterozoic Uinta Mountain Group (770-742 Ma). Results of this study include a significant shift from a higher-diversity (H'= 0.60) fauna that includes some ornamented acritarchs to a lower-diversity (H' = 0.11) fauna dominated by smooth leiosphaerids and microfossils of a bacterial origin (*Bavlinella/ Sphaerocongregus sp.*). This biotic change co-occurs with a significant increase in total organic carbon values that directly follows a positive carbon-isotopic excursion, suggesting increased primary productivity that may have been the result of elevated sediment influx and nutrient availability. Both the biotic change and period of increased total organic carbon values correspond with the onset of an interval of anoxia (indicated by total iron to aluminum ratios above 0.60) and a spike in sulfur concentration.

Like those reported from the Chuar Group, these biotic and geochemical changes in the upper Uinta Mountain Group are independent of changes in lithofacies, and they suggest that either a eutrophication event or direct inhibition of eukaryotes by sulfide (or perhaps both) may have been the cause of the biotic turnover. These findings support current correlations between the Uinta Mountain and Chuar Groups, the idea that the biotic turnover preserved in both strata was at least a regional phenomenon, and current models of punctuated global ocean anoxia during mid- to late-Neoproterozoic time. Whether or not this hypothesized eutrophication event was more than regional in extent remains a very interesting question and will certainly be a focus of future research.

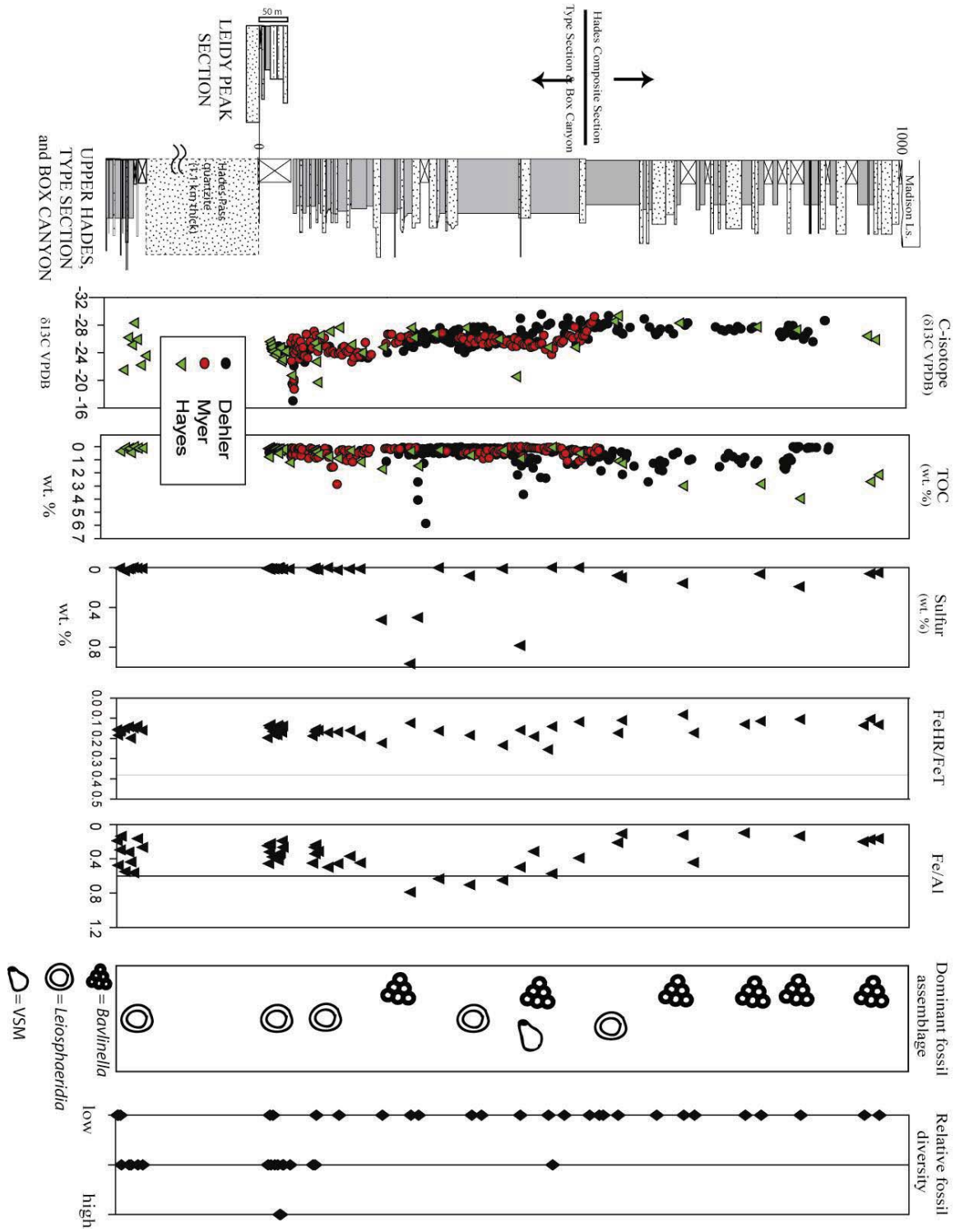


Figure 1. Composite stratigraphic column showing geochemical and biotic trends in the upper Uinta Mountain Group.

Spectrometric Connectivity: Seed Ferns and Reproductive Organs

Ulrike Werner-Zwanziger, Department of Chemistry, Dalhousie University, Halifax, Nova Scotia, Canada. e-mail: Ulli.Zwanziger@Dal.ca

Erwin L. Zodrow, Palaeobiological Laboratory, Cape Breton University, Sydney, Nova Scotia, Canada. e-mail: erwin_zodrow@cbu.ca

About 110 years ago the Carboniferous plant group that bore ovules and pollen organs (akin to living cycads) was named seed ferns (Scott, 1923), and thus from then on palaeobotanists have to separate fern-like foliage into true ferns and seed ferns, if possible. Collector's luck of finding ovules or pollen organs organically connected to the mother frond of a seed-fern is historically very slim—remembering that so far less than five cases are indisputably published, though hundreds of seed-fern species have been described. To make any headways with the seed ferns as natural (group) species, the scientific approach of hypothesis testing is necessary (Pearson, 1892). We believe that aspects of chemical investigation at the molecular plant level are a viable—if not the only alternative. Accordingly, we have been experimenting with ^{13}C NMR for a number of years, particularly singling out an ovule (Figure 1) that is physically associated with seed-fern foliage (Figure 2) in the Sydney Coalfield, Canada. The NMR spectra of these plant organs are intriguingly similar.

To deduce plant connectivity based on NMR spectra one first has to understand whether the detected chemical species are original to the plant material, or introduced by the natural processes occurring during Earth history, or by the chemical laboratory processes of liberating the coalified frond foliage from the rock and macerating it to get the cuticle. Even in the latter case, the detected chemical species are related to the chemical structures of the plant material as it is presented in modern times. A prerequisite for deducing connectivity based on NMR spectra is an identical, or at least similar, fossilization history for the test organs in terms of thermal, geochemical and lithological histories. Based on the similarity of the ^{13}C cross-polarization (CP)/Magic Angle Spinning (MAS) NMR results for the ovule (Figure 3 a) and associate foliar cuticles (Figure 3 b), we hypothesize that spectrometric connectivity is a proxy for organic connection.

While the ^{13}C NMR spectra of the cuticles of the ovule and the associated frond cuticles are very similar, there are also differences pointing to the different functions: The cuticles of the fronds show more saturated aliphatic chains and terminating methyl groups indicative of the hydrophobic frond-surface layer. Only the cuticles of the ovule, on the other hand, show signals in the acetal spectral region, a chemical group found, for example, in polysaccharides, which are the chemical building blocks of cellulose and starch, i.e., the structural components or energy-storage materials of plants.

References:

Pearson, K. 1892. The Grammar of Science. Walter Scott, London. pp. 493.

Scott, D.H. 1923. Studies in Fossil Botany. Vol. II Spermophyta. A. & C. Black, Ltd, London. pp. 446.

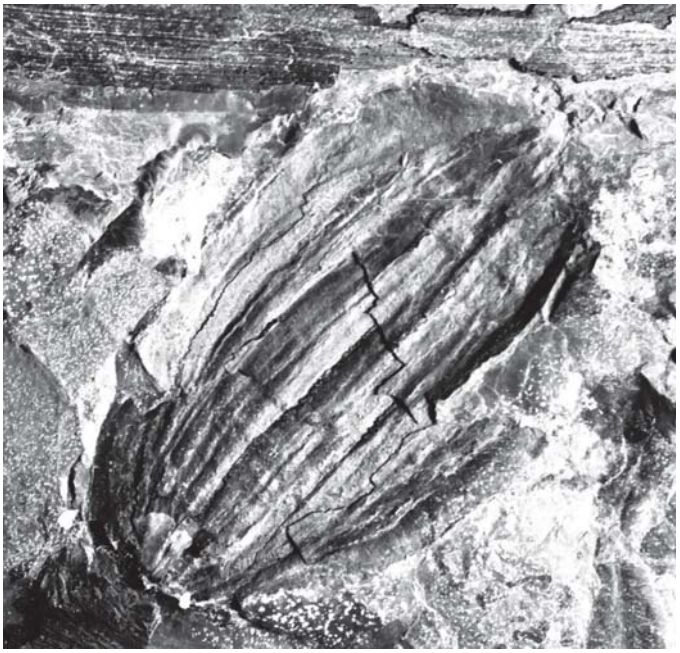


Figure 1. Ovule, 8 cm long with cuticles (*Trigonocarpus grandis*).

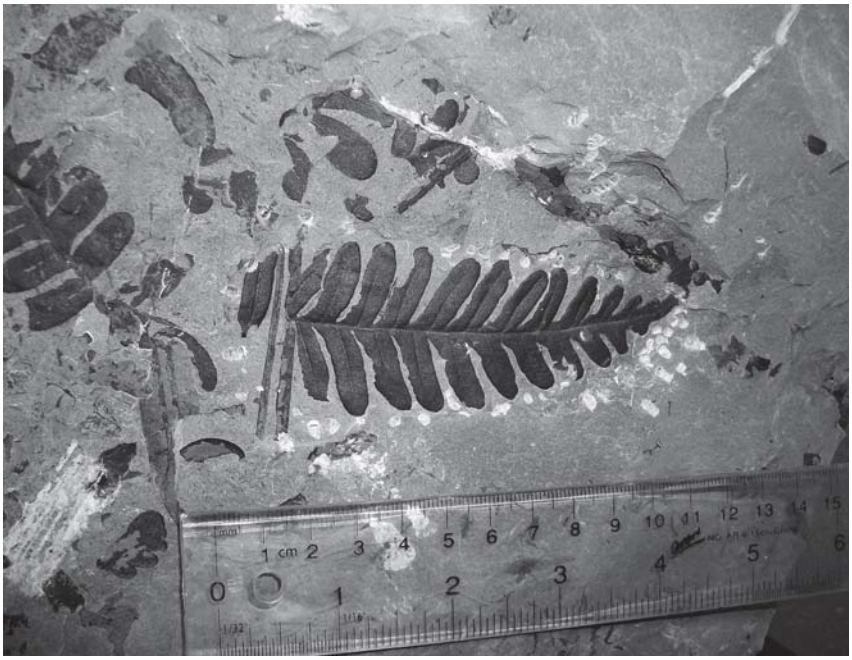


Figure 2, Seed-fern foliage, 9-10 cm long (*Alethopteris pseudograndinioides*).

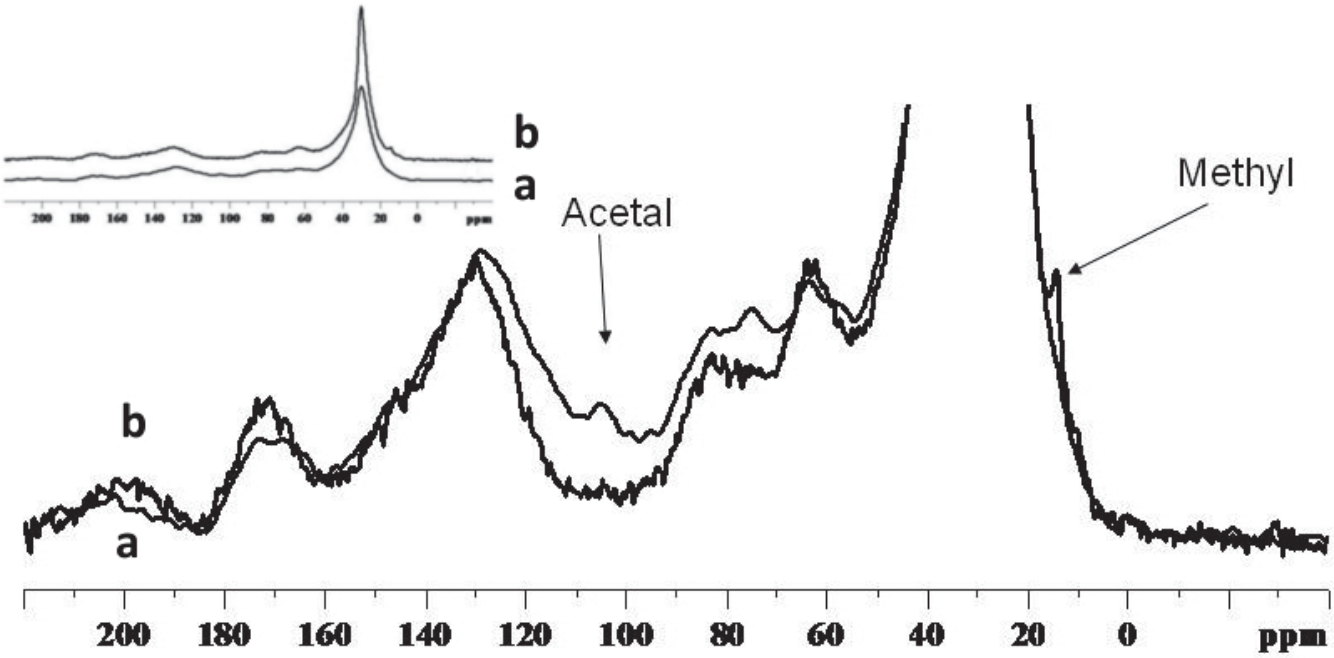


Figure 3. ^{13}C CP/MAS NMR spectra of the ovule (a) and the seed-fern (b).

Measured reflectance suppressed by thin-film interference of crude oil smeared on glass – as on vitrinite in coal or petroliferous rocks

Neely Bostick

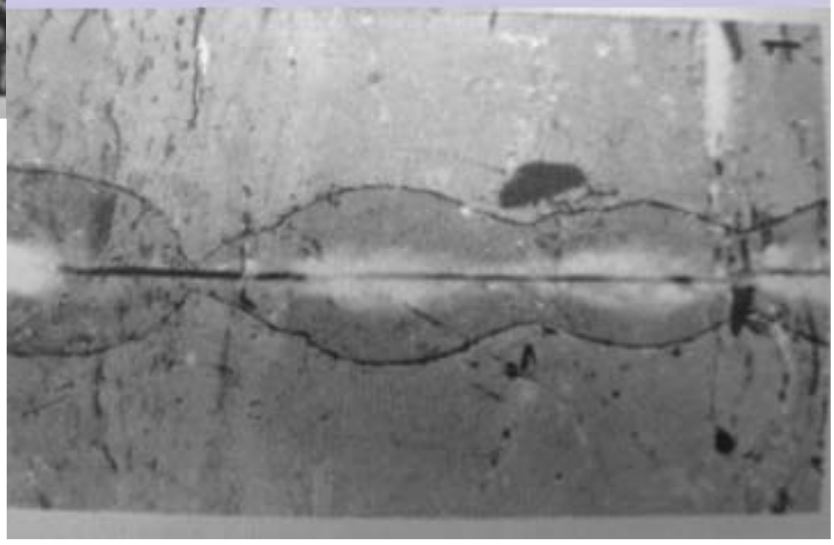
U.S. Geological Survey, Denver

The tool of measuring "vitrinite reflectance" under a microscope has great value in petroleum exploration and coal utilization, and the reflectance is a simple number, such as 1.4% R_o, with some slight variations depending on technique. Sample collection, preparation and measurement are simple and many sedimentary rocks yield vitrinite. However, the reported number can lead one astray if its origin and quality are not fully understood. I analyze here just one factor, "smear" of crude oil on the polished surface (from the sample), which may reduce reflectance because of thin-film interference. Some other causes of error are listed in an addendum to this note.

After Dr. Heinz Damberger sent Dr. Marlies Teichmüller a suite of bituminous coals from the Illinois State Geological Survey, she reported oil-like coatings on polished surfaces. She found similar films on some other coals and published a paper in 1974 with many examples (Advances in Organic Geochemistry 1973; p. 379-407). I reproduce two examples of her "smear film" here as photos 1 and 2. These also are included in the Taylor et al. 1998, Organic Petrology textbook.

1. Newton rings at pyrite islands; air immersion; HvCb coal

2. Smear; oil immersion; HvAb coal

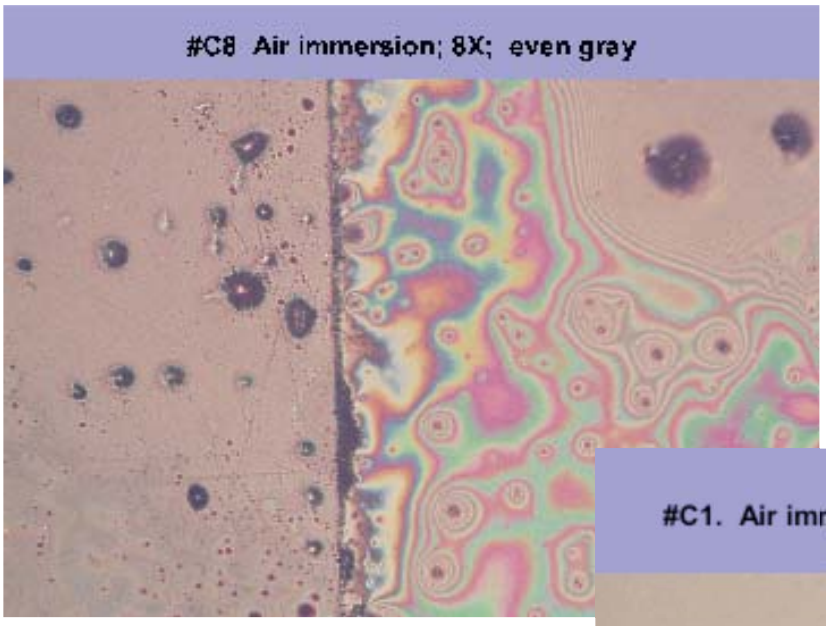


I saw similar smear films on coal when I worked in Illinois, but my work on non-coal rocks used acid maceration and floatation to concentrate vitrinite so any oil was likely removed in processing. When coal was part of such studies, we crushed and treated it with acids to be consistent with the other rocks.

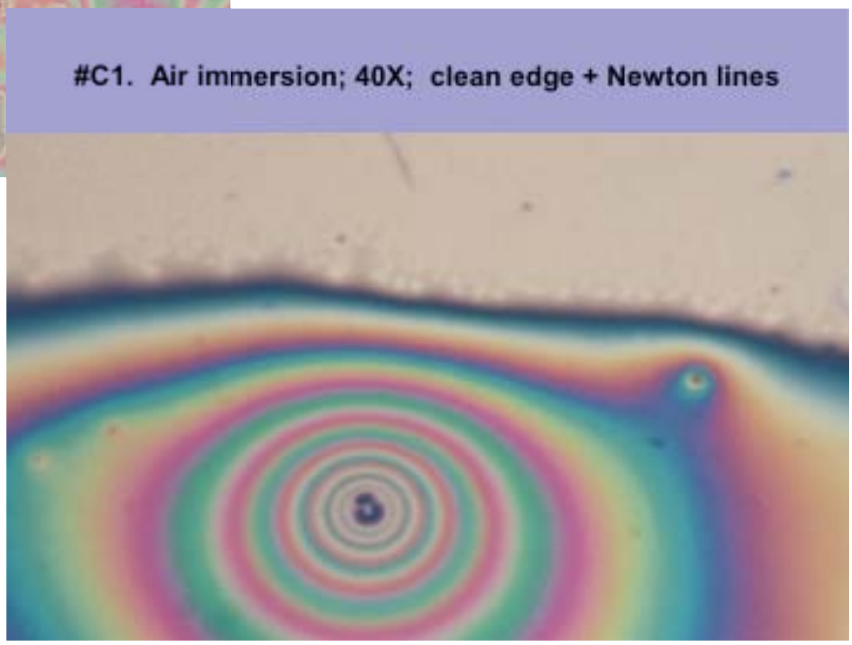
In the present study I measured the microscopic mean reflectance of polished glass standards with known refractive index and calculated reflectance under air, water, normal commercial immersion oil and aqueous zinc bromide (with the same RI as the immersion oil). Standards lent by Dick Harvey (Illinois State Geological Survey) were a D. Cole multiple-glass standard and a variety of standards from ASTM exercises.

For each analysis a touch of crude was put on the polished glass with a pin, then spread as thin as possible with a strong jet of air through a hypodermic needle. The crude oils were; 1) a very sulphur rich heavy oil from phosphatic rocks (from Paul Lillis, U.S. Geological Survey) and 2) a light Illinois crude (from Joe Hatch, U.S. Geological Survey).

Using white light, features I observed on glass smeared with a thin film of crude include; 1) even light brown film, 2) red and green to blue Newton interference lines and rings around dust, 3) broad rose-colored areas, 4) gray areas, and 5) stringy tracks of crude. I picture here two examples (Illinois light crude). Surprisingly, I saw no sign that the crude film changed under the light except for minor shifting of interference lines.

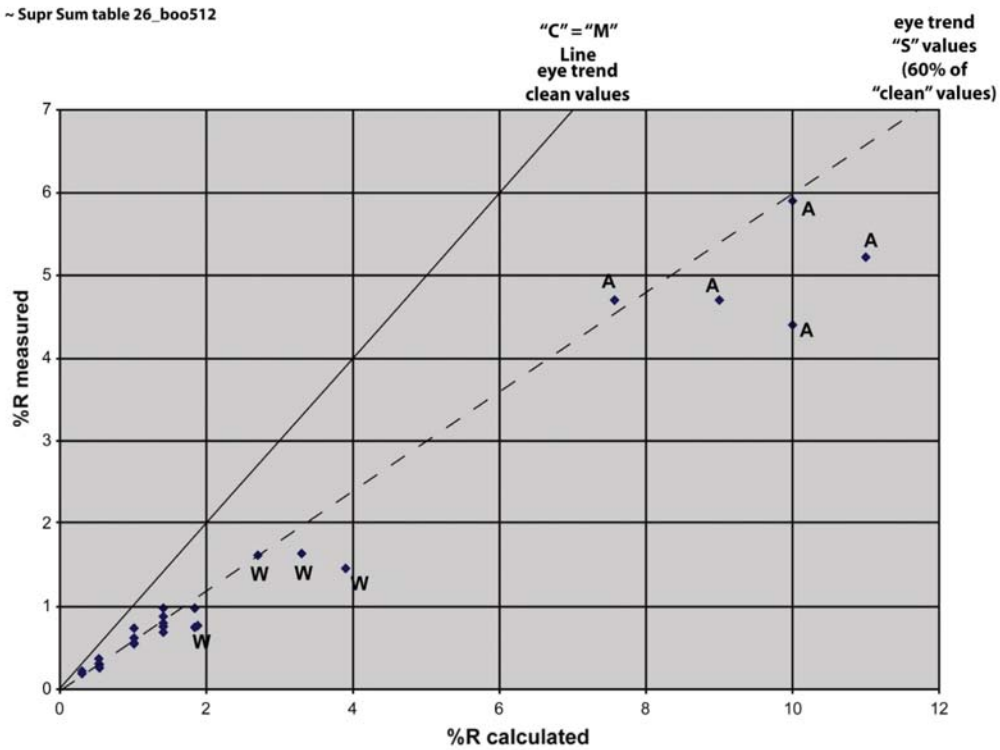


The even gray or faintly tinted area in the upper right corner of #C8 is the sort of film I measured mainly. The left half is plastic mount.

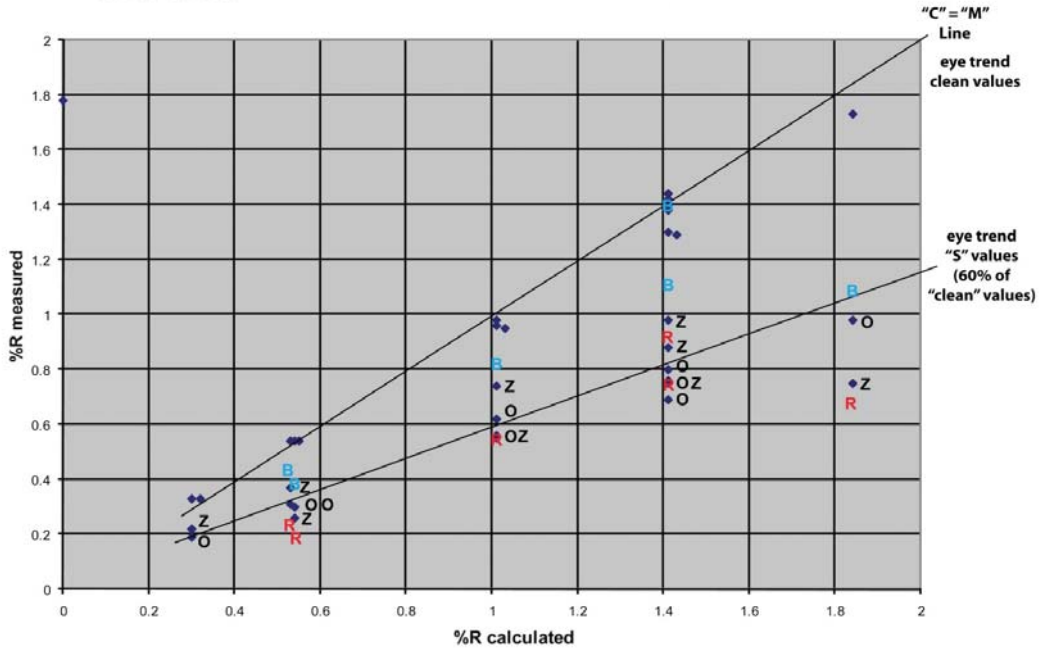


Many parts of the smear showed dramatic colors of Newton interference lines as in #C1; the uncolored area at top is clean glass.

Measurements. The following two graphs show measurements on even gray areas, where I could get fairly consistent reflectance values. In addition, I found some red or blue Newton interference color bands that were broad enough to measure, marked "R" and "B" on the second graph. Since I was using the usual 546 nanometer "green" photometer filter for this study, there is a great difference between values on red vs. blue areas. The glass standards used in this study would have the range of 0.3% to 1.8% Ro if free of crude films. I measured the film-coated standards under air (RI=1.0), water (RI=1.33), aqueous zinc bromide (RI=1.52), and normal microscope immersion oil (RI=1.518).



Measurements on even gray areas of crude smear on different glass standards. The unlabeled low values were with microscope immersion oil; the higher labeled values are water (W) and air (A) immersion. A visual trend line through the points for crude-smeared glass (S values) is about 60% of the solid line that would result from measurement of clean glass standards. C=M refers to calculated vs. measured reflectance.



The part of the first graph below 2% reflectance is enlarged in this second graph, plus values from clean glass (unlabeled dots near the upper line). % R measurements of glass at an even gray area of smear include; 1) values using microscope oil immersion - "O", 2) values using aqueous zinc bromide immersion (with a RI equal to that of traditional immersion oils) - "Z", 3) a few values "B" and "R" from measurements on blue or red interference lines using zinc bromide immersion.

Under blue excitation, the smear crudes used in this study fluoresce, which I did not analyze. Possibly fluorescence could be used to detect smear films that are otherwise not visible.

In summary, a smear film of crude could be overlooked easily, especially under oil immersion, and the lowered reflectance that it causes is about 60% of the true value. Perhaps an experienced petrologist correctly picks stain-free areas to measure, but a routine look at polished preparations under air or water immersion before measuring reflectance under oil immersion could help detect smear films. Also cleaning polished surfaces with solvents could remove crude film, but should be studied for possible adverse effects on reflectance.

Possible causes of error in vitrinite reflectance:

Borehole caving: In drilling for oil and gas, rock cuttings are routinely sampled at the surface as the bit cuts deeper into the earth. Experienced geologists can estimate the depth from which cuttings originate, but they have little control over rocks dislodged by the drill pipe at any depth above where the bit actually cuts. So % R_o of cuttings has inherently uncertain meaning except where casing is set at intervals above drilling.

Lignite additive: Lignite, sometimes weathered (leonardite) or processed specially with other additives, is a common additive in drilling muds. Processed lignite might be recognized, but lignite heated in hot drilling mud might give false "maturity", and inertinite residue from pulverized lignite could be misunderstood easily as vitrinite.

Reworked OM: Palynologists sometimes identify microfossils redeposited from older to younger sediments. It is clear that vitrinite is also reworked. In extreme cases ALL the "vitrinite" in a rock could be reworked as has been reported (Neil F. Petersen) in some Tertiary rocks in Alaska.

Fluid absorption: It has been reported that fluid, especially compounds of petroleum, may be absorbed into vitrinite. One lab study to test that was inconclusive and another study suggested that no problem exists.

Processing: Rocks have a false high maturity in the case where washed borehole cuttings are dried in pans at high temperature in haste to bag them.

Polish: Polish quality of rock or kerogen can be judged fairly well by the microscopist, but especially in whole rock preparations, surfaces may have high relief.

Desiccation: Desiccation of polished preparations is standard in coal laboratories, but low rank materials may have the reflectance increased by desiccation.

Vitrinite type: Coal literature includes description of Type A and Type B vitrinite, perhydrous type, and other designations, which include isorank variation of vitrinite reflectance.

Solid bitumens: They have been measured and correlated with vitrinite reflectance, but their recognition can be uncertain and subjective.

Smear film: Smear is the coating of the polished surface with another material, the subject of this talk.

Operator choice: The operator must select suitable grains to measure; it may be difficult to decide which organic grains to measure as first-cycle vitrinite.

Oil bloom: Commonly plumes of liquid rise from the sample under strong light; some liquids could change the RI of immersion oil.

Measurement: Equipment stability, standardization, and lens internal reflectance should be verified. The method of averaging or graphing readings should be clear.

TSOP 28th Annual Meeting
July 31 – August 4, 2011
Halifax, Nova Scotia, Canada

ORGANIZING COMMITTEE:

Chair: Prasanta Mukhopadhyay (Muki), Global Geoenergy Research Ltd muki@global-geoenergy.com
Co-Chairs: Mike Avery, Geological Survey of Canada - Atlantic mavery@nrcan.gc.ca
Dave Brown, Canada Nova Scotia Offshore Petroleum Board dbrown@cnsopb.ns.ca
John Calder, Nova Scotia Department of Natural Resources jhcalder@gov.ns.ca
Paul Harvey, Nova Scotia Department of Energy harveypj@gov.ns.ca
Hamed Sanei, Geological Survey of Canada – Calgary hsanei@nrcan.gc.ca

Location & Venue:

World Trade & Convention Centre, 1800 Argyle Street in the centre of the city. The WTCC is steps away from hotels, restaurants, parks and other amenities. Information on the venue can be found on its website: http://www.wtcchalifax.com

Registration pricing:

Registration*:	Members	Non-Mbrs**	Students	
	$325	$350	$100	Earlybird
	$350	$375	$115	Regular after June 15
	$375	$400	$130	Late after July 15

One-day registration:	$150	includes only coffee-breaks and program volume
Short course:	$200	includes lunch and short course notes
Fieldtrip:	$450	includes fieldtrip guide, transportation, meals and **2 nights accommodation** **Important**: Since we will be leaving Tuesday evening you do not need to book a room at the main meeting hotel for the night of Aug 2nd.
Banquet:	$60	Special guest speaker: **Dr. Richard Hoover**, NASA Topic: Life in the Cosmos

Guests		
Fieldtrip:	$250	includes transportation, meals and accommodation (double occupancy with registering partner)
Ice-breaker:	$25	includes one bar ticket
Banquet:	$60	

Tour (Partners):		
Lunenburg area	~ $40	Tuesday Aug 2nd - If numbers allow we will arrange a tour to several scenic South shore area which are within 1-1 ½ hrs from Halifax. Lunch will be an opportunity to sample fresh seafood at a seaside restaurant (lunch costs not included).

Tour Note: For meeting attendees who cannot participate in Tuesday's tour, we could arrange a similar pre-meeting excursion to the same area on Sunday. It would be contingent on getting enough expressions of interest prior to the meeting. The costs would be similar to the tour listed above. Please send us an email as early as you can so we can have time to make arrangements.

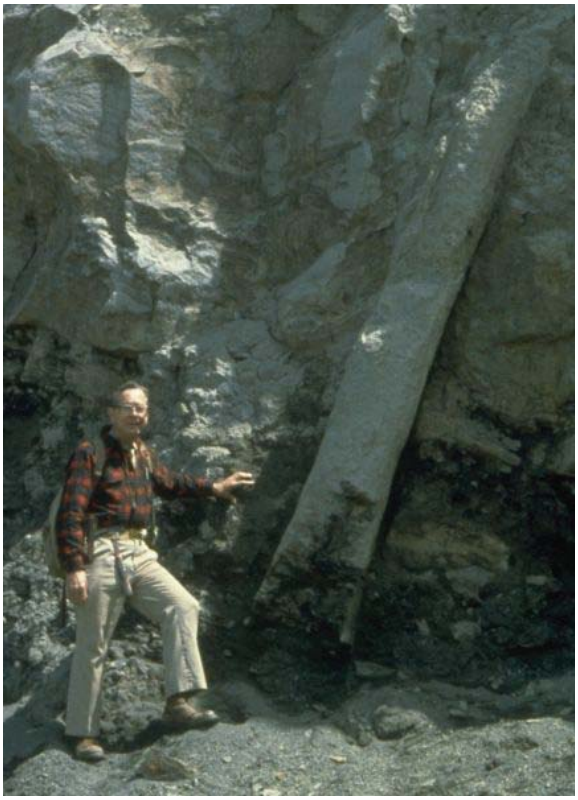
Short Course:
A one-day short course is planned for Saturday, July 30th. The course, tentatively titled *"Geochemistry, Maturation, and Petroleum System Modelling Related to Shale Gas Resource Evaluation",* will have three segments and instructors:

- *"Shale Gas Geochemistry"* - Dan Jarvie, Worldwide Geochemistry Inc.
- *"Shale Gas Modelling"* - Dr. Thomas Hantschel , Schlumberger Inc.
- (Tentative) *"Maturation and Organic Facies*" -Dr. Prasanta Mukhopadhyay

Details on the course including course abstracts can be found at our website.

Field Trip:
A two-day trip is planned. Day 1 will be spent in the Sussex, New Brunswick area examining outcrops of Mississippian gas-producing fluvial reservoir and lacustrine source facies, and later a trip to an shale gas/tight gas plant. Day 2 will be a day-long excursion along the cliffs of the Pennsylvanian fluvial and coal successions of the famous Joggins Fossil Cliffs World Heritage Site followed by a visit to the site's new museum.

Below: Outcrop section from New Brunswick shale gas field trip area.



Right: Upright fossil tree trunk at the famous Joggins site taken during the 1992 Euramerican Coal Province Symposium with TSOP Honorary Member Aureal Cross for scale. Photo credit: John Calder, Nova Scotia Department of Natural Resources.

Planned Program / Schedule

TSOP 28th Annual Meeting, Halifax, Nova Scotia, July 31-August 4, 2011

		Sunday July 31st	Monday August 1st	Tuesday August 2nd	Wednesday August 3rd	Thursday August 4th
800	am	Registration			Field Trip Day 1 Joggins Fossil Cliffs World Heritage Site & Fossil Museum Bay of Fundy Joggins, Nova Scotia Leader: John Calder, NS Dept of Natural Resources (Travel to and overnight in Sussex, N.B.)	Field Trip Day 2 Reservoir and fluvial facies outcrops, and shale gas evaluation site in the Elgin and Moncton Subbasins Sussex Area, New Brunswick Leaders: Steven Hinds, NB Dept Natural Resources & David Keighley, UNB (Return to Halifax with stop at the Airport)
830		Short course	Technical Presentations	Technical Presentations		
900						
1000						
1030						
1100						
1130						
1200	pm	Lunch	Business Lunch (Annual General Meeting)	Lunch (Group Photo)		
1230						
100		Short course		Technical Presentations		
130						
200			Technical Presentations			
230						
300						
330						
400						
430						
500		Dinner Break				
530						
600						
630						
700		Registration & Ice Breaker	Banquet with Guest speaker	Field Trip – Travel to and overnight in Amherst, N.S (~2 hours drive)		
730						
800						
830						
900						
930						

Note on Executive Council Meetings:
The Outgoing meeting is scheduled for Saturday, July 30 from 5:00 to 8:00 pm and the Incoming Meeting for Monday, August 1 from 5:00 to 7:00 pm. Council meetings will be held at a Prince George boardroom. Ask desk for directions.

Travel Information

Halifax, Nova Scotia is easily reached by air. The Halifax International Airport has over 600 flights a week with direct flights from many Canadian, U.S., European, and Caribbean destinations and many more connecting flights.

- International: London (Heathrow and Gatwick), Frankfurt, Paris, Reykjavik, Glasgow and Belfast.
- American: Boston, New York (LaGuardia and JFK), Chicago, Newark, Atlanta, Detroit and Washington
- Canadian: Toronto, Montreal, Ottawa, Hamilton, Calgary, Edmonton

Travel into the centre of Halifax from the airport takes about 25-35 minutes depending on the traffic and can be via taxi, limousine or hotel shuttle bus. Here are some helpful #'s:
Sunshine share-a-cab ($28/person with 2 persons; mention Dr. Muki): 1-800-565-8669/902-429-5555
Casino Taxi: 902-429-666 or Yellow Cab: 902-420-0000
Airporter shuttle bus: 902-873-2091/468-9415
Rental car agencies are just outside the baggage area and look for commissionaires and information booths for more help. Please visit the Airport website for more details and links.

Tourist and Related Information / Maps, Etc:
Destination Halifax: www.destinationhalifax.com
Halifax Tourism: www.halifaxinfo.com

Spousal / Partner tour

A one-day trip is planned to the renowned shipbuilding, fishing port of Lunenburg, which is another UNESCO World Heritage site. Get a taste of a seafarer's life in this famous port (see image below) with an outstanding seafood lunch. See website for more details.

A view of the town from the Lunenburg waterfront.

Photo credit: www.travelandtransitions.com/stories_photos/lunenburg.htm

KEYNOTE SPEAKERS

Notes: These are not complete citations but are presented here to provide information on the quality and scope of talks confirmed for TSOP Halifax 2011.

UNCONVENTIONAL

Garfield W. (Skip) Hobbs IV (President, American Geological Institute)
Future of the Global Oil Industry: The Resources and Challenges

John B.Curtis (Colorado School of Mines, Golden, Colorado, USA)
North American Shale Gas Resources, Reserves, and Production: A Geological and Geochemical Perspective

Basim Faraj (Questerre Energy Corporation, Calgary, Alberta)
The Business of Shale Gas: How Our Technical Work Fits Into The Relevance Of The Business Model

Daniel M. Jarvie (Energy Institute at Texas Christian University, USA)
Evolutionary Understanding of Shale Resource Systems

David Mosher (GSC Atlantic, Dartmouth, NS)
Gas Hydrate Resources on Canada's East Coast: Fact or Fiction

Bjorn Wygrala & Thomas Hantschel (Schlumberger Inc., Aachen, Germany Research Center)
Modeling Unconventional Petroleum Systems - Current and Future Developments and Applications

COAL

William D. Gunter (Alberta Research Council, Edmonton)
CO2 Carbon Capture and Storage in the 21th Century: Pore Space to Commerciality - An Alberta Perspective

Michael Kruge (Montclair State University, New Jersey)
Environmental Impacts of the Use of Petroleum and Coal

Robert Milici (U.S. Geological Survey, Reston, VA)
Forecasting U.S. peak coal production, the need for probabilistic assessments of U.S. coal reserves

LIST OF PRESENTATIONS

UNCONVENTIONAL

Tom Bowman (ZaZa Resources, Houston). **Cretaceous Eagle Ford Shale - lessons learned for future shale plays**

Brian J. Cardott (Oklahoma Geological Survey, USA). **Application of organic petrology to shale oil and gas potential of the Woodford Shale, Oklahoma, USA**

Gareth Chalmers (U of British Columbia, Vancouver), Bustin, R.M., and Bustin, A.M.M. **Lithological controls on hydrocarbon saturation, total porosity, pore size distribution, and matrix permeability of Devonian strata of the Horn River Basin**

Ahmed Chaouche (Anadarko Petroleum Corporation, Houston, Texas) **The Paradox of Low CO2 Production in Shale Gas Plays**

Mark E. Curtis (University of Oklahoma, USA), Ray J. Ambrose, Carl H. Sondergeld, and Chandra S. Rai
Investigating the Structure of Gas Shales on the Nanoscale by FIB/SEM Tomography and STEM Imaging

Jinxing Dai (PetroChina, Beijing), Yunyan Ni, Xiaoqi Wu, Shipeng Huang, Fengrong Liao
Stable Carbon Isotopes of Coal-derived Alkane Gases in China

Thomas Gentzis (Core Laboratories, Houston) **Characteristics and production potential of the Barnett Shale in the oil window part of the Fort Worth Basin**

Thomas Gentzis (Core Laboratories, Houston) **A review of CBM production data from the Horseshoe Canyon coals in the Alberta Plains, with an emphasis on their producibility in the vicinity of the Ermineskin First Nations acreage**

Lila W. Gurba (University of New South Wales, Sydney) **Potential Risks and Challenges to Shale Gas Explores in the Sydney-Gunnedah Basin, New South Wales Australia**

Peter Hill (Triangle Petroleum Corporation, Denver, Colorado) **A review of the resource potential of the Maritimes Horton Bluff Group within the Windsor Sub-Basin and the challenges facing commercial production**

Wolfgang Kalkreuth (Instituto de Geociências, UFRGS, Brazil), M. Holz, J. Levandowski, P. Weniger, B. Krooss
CBM and Shale Gas Potential in Brazil – Example from the Santa Terezinha Coalfield, Rio Grande do Sul

Berhard M. Krooss (RWTH Aachen University, Germany), Alexandra Amann-Hildenbrand, Matus Gasparik, Yves Gensterblum, Amin Ghanizadeh, Philipp Weniger. **Transport Processes in Coals and Gas Shales: An Experimental Perspective**

Jingdong Mao (Old Dominion University, Norfolk, VA), Justin E. Birdwell, Xiaoyan Cao1, Mark Chappell, and Yuan Li
Characterization of oil shale, isolated kerogen, and post-pyrolysis residues using advanced 13C solid-state nuclear magnetic resonance

Tom Martel (Corridor Resources: McCully Gas Field, New Brunswick) **Large Scale Mineralogical and Organic Changes within the Lacustrine Frederick Brook Shale of the New Brunswick Moncton Basin**

Maria Mastalerz (Indiana University, Bloomington), Arndt Schimmelmann,, Dariusz Strapoc. **Microbial gas in the Illinois Basin: Pennsylvanian coals versus Devonian/Mississippian shales**

Robert C. Milici (U.S. Geological Survey, Reston, VA) **Assessment of the Devonian gas shales of the Appalachian Basin, a critique**

Quinn R. Passey (ExxonMobil Upstream Research Co), K. M. Bohacs, W. L. Esch, R. E. Klimentidis, and S. Sinha
My Source Rock is Now My Reservoir - Geologic and Petrophysical Characterization of Shale-Gas Reservoirs.

J.C. Pol (Southwestern Energy, Houston, TX, USA), A. H. Silliman, R. Sassen, C.X. Allison, N.J. Atkinson
Geochemical assessment of the resource potential of the Albert Formation (Frederic Brook Shale Member), Maritimes Basin, New Brunswick, Canada

Udaybhanu Samanta (ONGC Ltd., India) **Factors responsible for Syn-rift Passive Margin Source Rock Development in India**

Roger Sassen (Texas A&M University, USA). **Seafloor gas vents, gas-hydrate, chemosynthetic communities, oil mats, and oil slicks: consequence of a poorly-sealed petroleum system in the northern Gulf of Mexico slope**

Arndt Schimmelmann (Indiana University, USA), Maria Mastalerz. **Hydrogen fuel: Technical opportunities and challenges**

COAL

Harvey E. Belkin (U.S. Geological Survey, Reston, VA) & Susan J. Tewalt. **Bromine in United States coals**

Jesse Carrie (University of Manitoba, Canada), Hamed Sanei, Gary Stern
Standardisation of Rock-Eval Analyses for the Analysis of Recent Sediments and Soils

Margo D. Corum (U.S. Geological Survey, Reston VA), Kevin B. Jones, and Peter D. Warwick
State of Knowledge Regarding CO2 Sequestration Potential of Unmineable Coal

Alexandra Golab, **Colin Ward** (University of New South Wales, Sydney, 2052, Australia), Asep Permana, Paul Lennox
High-resolution three-dimensional imaging of coal samples using microfocus X-ray computed tomography, with special reference to modes of mineral occurrence

Sharon M. Swanson (USGS, Reston, VA), Mark A. Engle, Leslie F. Ruppert, Kevin B. Jones and Ronald H. Affolter
Characterization of Coal Combustion Products from Power Plants Burning High- and Low-Sulfur Coals in the United States

A.K. Srivastava & **Deepa Agnihotri** (Birbal Sahni Institute of Palaeobotany, India)
Coal seam correlation of Indian Gondwana coalfield: a palaeobotanical perspective

Louis Loung-Yie Tsai (National Central University, Jhongli, Taiwan), Yi-Chi Lee, Su-Huei Wu
Physical and chemical characterization of coal in related to CO2 sequestration and CBM recovery

POSTERS

Alexandra Amann-Hildenbrand (RWTH Aachen University, Germany), Andreas Busch, Pieter Bertier, Ines Rick, Philipp Weniger, Bernhard M. Krooss
Transport and Sealing Properties of Clay-rich Lithotypes Exposed to CO2

Agnieszka Drobniak (Indiana Geological Survey, USA) & Maria Mastalerz
Gallium and germanium in Indiana coals

Melissa Freeman (University of Calgary, Alberta), Chris Clarkson, Hamed Sanei
Lithological controls on permeability variations in the Lower Triassic Montney Formation, Pouce Coupe AB

Paul Hackley(USGS, Reston, VA), Carla V. Araujo, Ángeles G. Borrego, Brian J. Cardott, Alan C. Cook, Mária Hámor-Vidó, Kees Kommeren, João G. Mendonça Filho, Jane Newman, Mark Pawlewicz, Judith Potter, Isabel Suárez-Ruiz
New ASTM standard test method D7708-11 for determination of the reflectance of vitrinite dispersed in sedimentary rocks

Paul C. Hackley (USGS, Reston, VA), Frank T. Dulong, Brett J. Valentine. **Preliminary results of artificial maturation experiments on a subbituminous Wilcox coal**

Saito Hiroyuki (Hokkaido University, Sapporo, Japan), Noriyuki Suzuki, Koji U. Takahashi, Hitoshi Hasegawa
Resource potential of thermogenic coalbed methane in Paleogene coals, Hokkaido, Japan

Hu Guoyi (PetroChina, Beijing), Zhangshuichang, Zhangmin, Li Wei. **The geochemical and organic petrological characteristics of coal and associated mudstone of Xujiahe formation in the Sichuan basin, China**

Pin-Ru Huang (National Oceanography Centre, Southampton UK), John Marshall, Philip Scotney
The relationship between heavy metals and sedimentary organic matter in the Oxford Clay (Jurassic) of the southern UK

Tatiana M. Juliao Lemus (ECOPETROL-ICP, Columbia)
Coal Seams from Paleocene Marcelina Formation: Possible Petroleum Source Rock? Evidences from Organic Petrography. Western Venezuela

Li Jian (Petrochina-Langfang, China), Han Zhongxi, Yan Qituan. **Distribution characteristics of mercury content in natural gas and its origin**

Jean-frank John Mayagilo (Tanzania Petroleum Development Corporation) **Spore Colour Index as a Tool in Solving Tectonic Problems in Petroleum Exploration? A Case Study of Tanzanian Coastal Basin**

Hossein Mosaddegh (Damghan University, Iran), Ali akbar Hassannezhad, Mahmoud Memariani, Nader Dabestani, Hamed Dabestani. **Organic Geochemical Investigation on Lower Carboniferous Organic Rich Sediments (Mobarak Formation) in Eastern Alborz, Iran**

Yunyan Ni (PetroChina, Beijing) & Jinxing Dai. **Geochemical characteristics of biogenic gases in China**

Prasanta K. Mukhopadhyay (Global Geoenergy Research Limited, Halifax, Canada)
Development of Organic Pores on Kerogen and Solid Bitumen: Effect of Maturaton and Organic Facies in Shale

Angelo Plata (NATFRAC Corporation, Columbia), T. Juliao, C. Parra, D. Torres
Changes of Kerogen through the Hydrous Pyrolysis Process, Optical and Morphological Evidences

Sandra Rodrigues (Universidade do Porto, Porto, Portugal) & Isabel Suárez-Ruiz
Evolution of Optical properties during graphitization of unburned carbons from fly ash

Ricardo Ruiz M (Centro de Investigación Gmas, Bogotá, Colombia), Daniel Gomez M, Astrid Blandón M, José Jaramillo M **Comparison of the thermal maturity of organic matter in sediments of the Late - K in the Upper Magdalena Valley, Colombia; obtained by several methods and their impact on the exploration of conventional oil resources and unconventional ones**

Leslie F. Ruppert (U.S. Geological Survey, Reston, VA), Richard Sakurovs, Tomasz P. Blach, David F.R. Mildner, Lilin He, Yuri B. Melnichenko**. A USANS/GP-SANS Study of the Accessibility of Pores in Gas Shale to Methane, Water, and Brine**

Koji U. Takahashi (Hokkaido University, Sapporo, Japan), Noriyuki Suzuki, Hiroyuki Saito. **Hydrocarbon and non-hydrocarbon gases obtained by the pulverization of Hokkaido Eocene coal**

Michael H. Trippi, (U.S. Geological Survey, Reston, Virginia, USA) Susan J. Tewalt. **GIS data of the coal- and lignite-bearing areas of India and Bangladesh**

Halifax Harbour at night.

Halifax Citadel