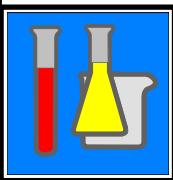




THE SOCIETY FOR ORGANIC PETROLOGY



NEWSLETTER

Vol. 32, No. 1

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32nd TSOP Annual Meeting

Yogyakarta, Indonesia



Fishing boats on the south Java coast near Yogyakarta. Photo courtesy of Tim A. Moore.

20th to 26th September, 2015

TSOP 32ND Annual Meeting 20th – 26th September 2015

On the Edge: Hydrocarbons in the Tropics

The Organising Committee is pleased to announce that plans are well advanced for your arrival at the TSOP 32nd Annual Meeting in Yogyakarta, Indonesia. The Workshop and Technical Programs will span from the 20th to the 23rd of September. A post conference field trip is planned for the Mahakam Delta area of east Borneo from the 24th to the 26th of September 2015.

This meeting will provide an opportunity to discuss different aspects of organic petrology in a special atmosphere in the heart of the cultural center of Java. Indonesia is the largest exporter of thermal coal in the world and has a huge and historic petroleum industry, dating back to the early 1900s. Come and join your Indonesian colleagues and exchange ideas, methods, hypotheses and results on all aspects of geology, geochemistry and petrology.

Our hosts for this year's meeting will be Gadjah Mada University, located in Yogyakarta. They are one of the premier universities in Indonesia, officially founded in 1949 and are renowned for their geoscience program in SE Asia.

Details of the meeting can be found on the meeting website <http://tsop2015.ugm.ac.id>. Abstract submission is open until May 29th 2015 and early registration prices are available until July 31st 2015. Feel free to advertise this event widely and please do not hesitate to contact the Organizing Committee if you have any questions.

Don't miss this once in a lifetime event - see you in Yogyakarta!

Best Regards,

TSOP 2015 Organizing Committee

Please see pages 8-16
for more meeting
details

Volcano near Yogyakarta
(© Tim A. Moore, 2007)



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 and field trips; sponsors research projects; provides funding for graduate students; and publishes a web site, a quarterly Newsletter, 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.

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. 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.

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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:

Rachel Walker
e-mail: drachelwalker@gmail.com

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/

The TSOP Newsletter 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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Newsletter Submission Deadlines

June Issue: June 5th, 2015
September Issue: September 5th, 2015
December Issue: December 5th, 2015
March Issue: March 5th, 2016

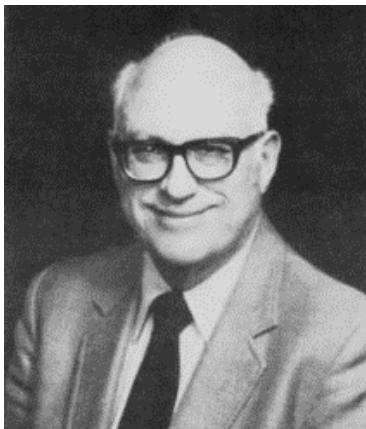
Institutional/Corporate Memberships



We'd like to make members aware that membership in TSOP is also open to any organization having an active scientific interest in organic petrology or related fields. TSOP especially encourages institutions to join at the special **institutional rate of \$75/yr** and help support the goals of the Society. See the website for details:

www.tsop.org/join.htm

John Castaño Honorary Membership Award Call for Nominations



Deadline: May 31, 2015

TSOP members are invited to nominate the scientist of your choice for the 2015 John Castaño Honorary Membership Award, The Society for Organic Petrology's highest honor (www.tsop.org/honmem.htm). The award acknowledges distinction in a scientific discipline of significance to the Society, recognition of contributions in research, service to TSOP and/or education. The John Castaño Honorary Membership conveys life membership in the Society. It is named in honor of John Castaño, one of our most active Houston-based founding members. John served as inaugural Vice-President, and later as President of TSOP. He was an organizer of three TSOP meetings in the Houston area, and was made an Honorary Member in 1995. John

served TSOP in many capacities until his death in 1997; a memorial article was published in the June 1997 issue of the TSOP Newsletter.

If you would like to suggest a candidate for the 2015 Castaño Honorary Membership Award, **please submit a letter of recommendation and a brief vita of the nominee to:**

Dr. Shifeng Dai
*China University of Mining and Technology,
D11, Xueyuan Road, Haidian District,
Beijing 100083,
P.R. CHINA*
E-mail: daishifeng@gmail.com

by May 31, 2015.

It is suggested that supporting letters of recommendation from colleagues and other scientists accompany the package. Emphasis should be placed on the significance of the nominee's work.

Nominations will be reviewed by the Castaño Award Committee and results will be announced at the Annual Meeting. The selection process is confidential and nominees do not have to be former or current TSOP members. The committee evaluates research, service and educational impacts based on the following criteria:

- Research contributions include work that demonstrates a high degree of originality and serves to advance the science of organic petrology or related disciplines. Nominees must possess a sustained international record of professional publication and achievement,

- Nominees recommended for service must demonstrate significant contributions to TSOP in a leadership role. Their service must have enabled the Society to stimulate interest and promote innovative research in coal geology. Contributions include educational activities, administrative duties, or the development of the Society,

- Nominees recommended for education must demonstrate a high degree of dedication and significant impact as a teacher of organic petrology or related disciplines.

Dr. Shifeng Dai
TSOP Vice-President and
Chair of the Honorary Member Selection Committee

New TSOP Members



Hoda Javanmard

Ms. Javanmard earned her BSc and MSc degrees in Chemical Engineering in 2007 and 2010. Upon graduation she started working at CSIRO, Australia, as a research officer. Her research area is experimental reservoir characterization focusing mainly on unconventional gas, e.g., coal seam gas and shale gas.



Bo Liu

Mr. Liu earned his MSc in 2014 from the China University of Geosciences in marine geology. He is currently engaged in doctoral studies at the China University of Geosciences where his research includes coal and environmental geochemistry.



Munira Raji

Munira earned an MSc degree from the Univ. of Derby in applied petroleum geoscience and a BSc from the Univ. of Portsmouth in geology. Munira is pursuing PhD studies at Durham Univ. looking at the North Sea Kimmeridge Clay Formation for offshore unconventional resources.



Natalie Debenham

Natalie currently is completing the second year of a Master of Research at Macquarie University after completing a Bachelor of Science with first-class honours, majoring in Geology and Geophysics & Applied Geology, at the University of Adelaide. Her

research on the Permo-Carboniferous Arkaroola Basin of south Australia includes proposal of a new model for cold climate source rock preservation and assessment of the utility of redox-sensitive trace metals as palaeo-proxy indicators within pore waters.



Vera Korasidis

In 2014, Vera completed her Bachelor of Science (Degree with Honours), majoring in Geology, at the University of Melbourne. Vera is now pursuing a PhD at the University of Melbourne focusing on the sedimentology, palaeobotany and palaeoenvironments of Eocene to Miocene peatlands of the Latrobe Valley in the Gippsland Basin.



Julián Esteban Jaramillo Zapata

Mr. Jaramillo received his MSc in mineral resources engineering from Universidad Nacional de Colombia for

a thesis entitled "Petrographic and geochemical evaluation of core samples from horizontal drilling of Amagá Formation Coals. His current project is a joint industry-government study entitled "Determination of the degree of explosibility of coal dust and the quantification of methane gas in coal seams from the Sinfaná basin."

+

Harvey S. Zeiss 1947-2014

Gareth Mitchell
Coal & Organic Petrology Labs
Penn State



Harvey Zeiss at the first annual TSOP Meeting, 1984

Harvey S. Zeiss, a founding member of TSOP, passed away October 23, 2014, in Pennsylvania's Lehigh Valley where he and his wife Janice came to make a home. Harvey was born on April 11, 1947, in The Bronx, New York. He served in the US Navy during the Vietnam War, but was stationed in a secure location in Japan. Harvey received his BS in Geology from Hunter College in New York City and his Masters in Geology from Penn State University where he completed his thesis "Dinoflagellate cyst zonation of some upper Jurassic and lower Cretaceous strata penetrated by the Sun KR Panarctic Skybattle Bay Well, Sverdrup Basin, Arctic Archipelago, Canada" under the tutelage of Dr. Alfred Traverse.

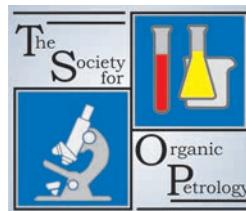
So what does a palynologist do after completing his thesis in 1976? He finds a job in the Raw Material

and Basic Studies Group, Research Department of Bethlehem Steel Corporation, which at the time was the second largest steel producer in the US. When I arrived in the same place in 1979, Harvey had made a home for himself. Dr. John "Jack" Crelling had just left to start up the Coal Characterization Laboratory at Southern Illinois University; Harvey had assumed many of Jack's duties including the daily operation of a large petrography laboratory, providing planning of the more than two billion tons of coal reserves, the evaluation of over 8 million tons of coking coal per year going to four integrated steel mills operating in New York, Pennsylvania and Indiana. Along with researchers in the steel characterization group, Harvey was a member of a team that was to bring the Leitz Texture Analysis System (TAS) to our laboratory in an attempt to develop and perfect image analysis to speed up the process of coal maceral and reflectance analyses.

It was not long before wanderlust got to Harvey and in about 1983 he left Bethlehem Steel to work with John Castaño at the Shell Development Company in Houston, TX. While at Shell, Harvey was chairman of the organizing committee for the second TSOP annual meeting. However, it was at this point I lost track of Harvey and, of course John is no longer around to fill in the blanks. It was rather a fluid time for many of us in the steel, oil and chemicals industries and while I was moving to Penn State University in 1986, Harvey was moving back to the Allentown-Bethlehem area of Pennsylvania to begin a new life away from geology and organic petrology.

He assumed new responsibilities in the sales department at Print-O-Stat and eventually retired after 23 years of service. He was an active member of Emmaus Moravian Church, serving on the Board of Elders, as a Synod Delegate, a Sunday School Teacher and a Crossroad Graduate of Moravian Theological Seminary. He was a member of the Bethlehem Masonic Lodge #283 F&AM and was an assistant Boy Scout Master where he earned his Wood Badge Award.

He is survived by wife Janice; son Geoffrey D. Zeiss, husband of Adrienne of Bangor, PA; two grandchildren, Katelyn and Joshua; and brother Philip Zeiss, husband of Nancy of Boone, NC.



&



TSOP is on Facebook!

Visit us at:

www.facebook.com/OrganicPetrology

ICCP Training Course Organic Petrology For Industrial Applications

1-4 September 2015
Potsdam, Germany

The International Committee for Coal and Organic Petrology (ICCP), in conjunction with Geolab, DGGV, Teichmüller Foundation and GFZ (the German Research Centre for Geosciences), is pleased to announce a training course in organic petrology to be held in Potsdam in September 2015. The course is centered on the petrology of a wide variety of coals. Practical applications and technological importance will be stressed. While a basic geological understanding will be assumed, the course is designed for those with little or no knowledge of coal. It is therefore suitable for undergraduate or postgraduate students as well as established professionals who require a more thorough understanding of petrological aspects of coals.

More information is at www.iccop.org.

TSOP 32ND Annual Meeting
20th – 26th September 2015
Yogyakarta, Indonesia

On the Edge: Hydrocarbons in the Tropics



Details of the meeting can be found on the meeting website <http://tsop2015.ugm.ac.id>.

Abstract submission is open until May 29th 2015.

Early registration prices are available until July 31st 2015.

Meeting Schedule (please check website for any revisions):



FIELD TRIP – MAHAKAM DELTA, EAST KALIMANTAN (BORNEO), INDONESIA

Hydrocarbons in the Tropics – On the Edge Field Trip

The 2015 TSOP Post-Conference field trip is scheduled to take place from **Thursday, 24th September to Sunday 27th September**.

We encourage people to join the field trip; this will be a unique opportunity to examine current hydrocarbon producing sediments and then see their exact modern equivalents being deposited today. Plus, Indonesia peat mires are often invoked by scientists around the world as a modern analogue for coal-forming environments, but few people have actually visited them in person. This is your chance. See what all the fuss is about.

Your field trip leaders will be:

Professor Chairul Nas (Trisakti University, Jakarta) – Day 1 & 4 (coal)

Dr Andang Bachtiar (National Energy Council, Jakarta) – Day 2 (Modern Environments)

Dr Tim A. Moore (Cipher Consulting Ltd., Brisbane) – Days 1 & 3 (coal & peat)

REGISTERING FOR THE FIELD TRIP

Delegates are encouraged to register for the field trip early. There is a limited number of spaces (strictly 30 persons), on a first come first serve basis.



Note that participants should be reasonably fit and be able to walk unaided on uneven and rough ground. Partners of participants are also welcomed to register.

Left: A Google Earth map showing key points of the field trip. Note that Samarinda is about 0° 30' S and 117° 08' E.

SCHEDEULE

Day 0, 23rd September (in Yogyakarta)

Evening: A 1-hr meeting with all the field trip participants to cover:

- Health and safety issues
 - Review of proper gear for the field trip (see below for a list of equipment, clothing and gear that each participant should bring)
 - Discussion of any special needs
 - First Aid review
- Contact details of where we'll be staying and going into the field
- General geology and plan of the field trip
- Questions and Answers

Day 1, 24th September

Early Morning: Fly from Yogyakarta (Java) to Balikpapan (Borneo). The flight takes about 2 hrs

Morning into Late Afternoon: After arrival at the Balikpapan airport, we will take a rented bus north to Samarinda. Stops will be made along the way at road outcrops and/or coal mines. All geological sections will concentrate on Miocene age coal-bearing sediments. These sediments are the source of all coal, as well as most liquid and gaseous hydrocarbons currently being exploited in East Kalimantan. We will be stopping along the way at a local café for lunch.

Evening: Check into hotel in Samarinda



Coal mine in the Miocene age Balikpapan Formation in East Kalimantan. Note that the lower most seam is about 1 m in thickness. Small channel form sandstones are formed about this coal. Total net coal in this mine ranges from 20-40 m (photo courtesy of Chairul Nas).

Day 2, 25th September

Morning: After safety check, board boat to examine some of the modern hydrocarbon producing environments along the Mahakam River and upper delta area.

Lunch: On Boat

Afternoon: Visit other modern depositional systems along the river and environs. Return to hotel.



Left: Aerial view of the lower Mahakam River Delta, looking east (photo courtesy of Tim A. Moore)

Below: Edge of an Indonesian peat mire (photo courtesy of Tim A. Moore)



Day 3, 26th September

Morning: Leave early to drive up river (westward) along the Mahakam River. Goal is to visit a modern peat forming system. The target peat system is between two tributaries of the Mahakam River which in the 1980s, burned, was flooded and since has peat forming on top of the burn/flooded surface.

Lunch: On site/in mire or local area.

Afternoon: Peat coring to examine depth and content of peat. We'll try for at least two sites, but this will be dependent on level of difficulty in accessing the bog.

Day 4, 27th September

Morning: Check out of Samarinda hotel and drive south towards Balikpapan. At least one stop at a coal mine will be scheduled.

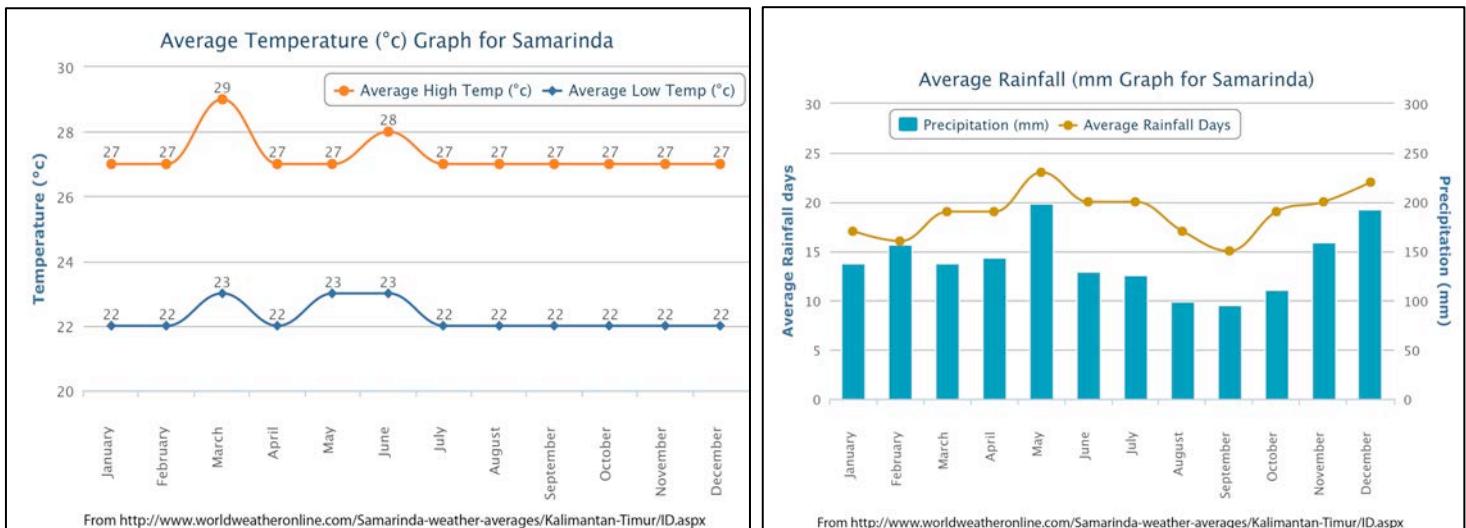
Lunch: A nice local stop for packed lunches.

Afternoon: Check into Balikpapan hotel, shopping and/or cultural experience.

Evening: Summing up of field trip and discussion. Cultural dinner and entertainment

CLIMATE

It will be hot and there will be sweat. The humidity is usually above 70% and often approaching 100%. The average rainfall for September is 100 mm; but expect some rain everyday – mostly likely thunderstorms.



Average temperature and rainfall variation in the Samarinda area, Kalimantan.

CLOTHING AND GEAR

As noted in the previous section on climate, it will be hot, humid and most likely at some point each day water will fall from the sky in abundance. When the sun is out it will be stifling. Thus, bring lightweight, fast-drying clothes. Bring a hat with a brim that goes all the way around. See the conference website (<http://tsop2015.ugm.ac.id/>) for a list of suggested clothes.

HEALTH HAZARDS DURING THE FIELD TRIP

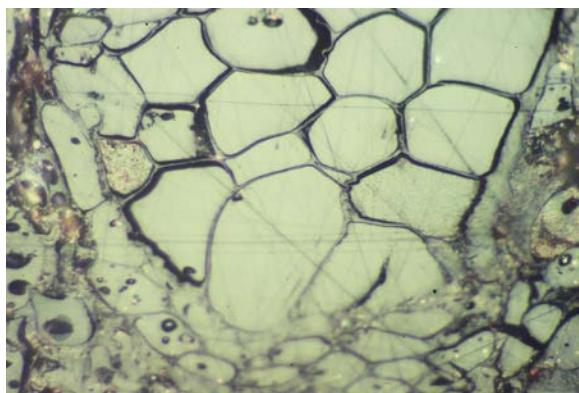
There are a number of tropical diseases that can be found in Indonesia but the risk of getting them is minimal. We will be staying in 4 star hotels in both Samarinda and Balikpapan. All participants are encouraged to seek out their own information but for starters see the conference website (<http://tsop2015.ugm.ac.id/>) for more detailed information and the following link: <http://wwwnc.cdc.gov/travel/destinations/indonesia.htm>. Note that heat stroke is probably the biggest health hazard.

Meeting Workshops

Introduction to Organic Petrology One-Day Workshop

About the course:

This course is designed as an introduction to organic petrology and is aimed at students, but will also be informative to technical and non-technical persons who work with coal. It will cover basic terminology (coal rank, grade and type), but focus on megascopic to microscopic organic components of coal. The components, or macerals, have distinctive features that record the starting plant material in the peat mires and the geochemical changes that occur during burial and coalification. Maceral composition will influence the utilisation properties of the coal as a fuel or metallurgical feedstock, as well as a hydrocarbon source rock.



Photomicrograph (x500) of Miocene age Indonesian coal from Kalimantan

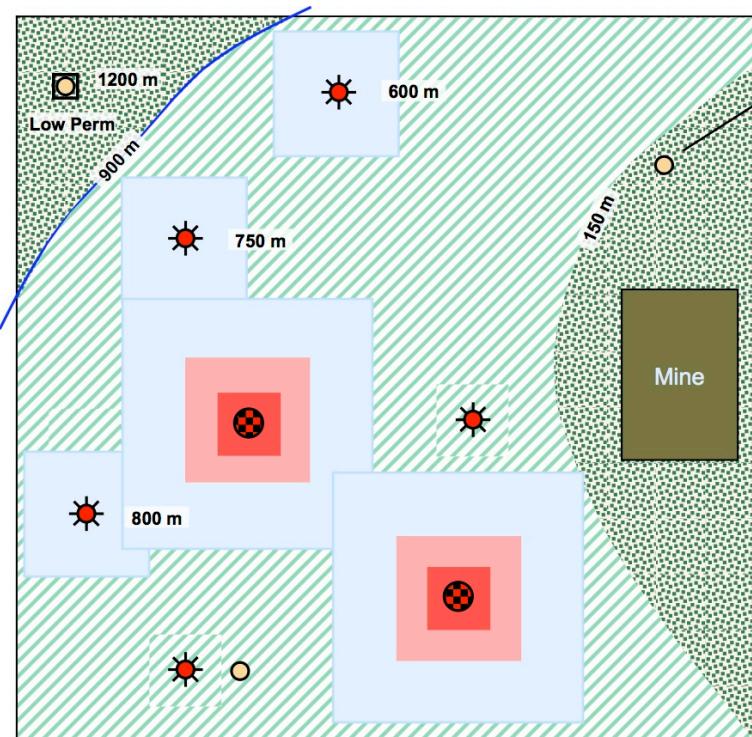
Course will include power point lectures and virtual petrography exercises, designed to check for understanding throughout the day.

The presenters will be **Dr Walter Pickel** (Coal & Organic Petrology Services P/L, Sydney, Australia) and **Professor Joan Esterle** (University of Queensland, Brisbane Australia). See more about them on the conference website (http://tsop2015.ugm.ac.id/geo/?page_id=77)

Introduction to Unconventional Reserve and Resource Assignments One-Day Workshop

About the course:

This course is designed as an introduction to unconventional reserve determinations and is aimed at reservoir and reserve engineers and geologists. The course will also be informative for technical and non-technical persons who work with coal and shale or unconventional reserves. It will cover basic categorization (Reserves, Contingent Resources and Prospective Resources), but focus on differentiation by classification systems (SPE-PRMS and others) and how data quantity and quality affect the categorization. The value of obtaining adequate field and laboratory data and the impact on leveraging that information for increasing reserve and resource booking will be discussed. A session will be held on uncertainty and variability in laboratory measurements and impacts on reserve booking.



Course will include power point lectures and participant question and answer sections throughout the day.

The presenters will be **John Hattner and Paul Dan Smith** (both from Netherland Sewell & Associates Inc., Dallas, Texas, USA) See more about them on the conference website (http://tsop2015.ugm.ac.id/geo/?page_id=85)

VISA REQUIREMENTS FOR INDONESIA – TSOP 2015

The good news is that the Republic of Indonesia is very VISA friendly to almost all countries in the world. Check out the following link, which is summarized below.

<http://www.indonesia-osaka.org/wp-content/uploads/2015/02/1.-VISA-PROCEDURE.pdf>

There are only eleven countries that are required to obtain visas before entry (see part C below); There are 64 countries that can obtain visa on arrival (for a small fee) at the airports (see part A below). Finally there are 20 countries who may enter free without a visa (see part B below).

A. Visa on Arrival

Entry Requirements for Visa on Arrival:

1. Passport must be valid for at least 6 months as of the date of entry into Indonesia
2. Round Trip Airline tickets/Confirmation slip
3. Visa Fee US\$35 (up to 30 days)

The list of countries below is permitted to enter Indonesia using Visa on Arrival:

1. Algeria	23. Iceland	45. Portugal
2. Argentina	24. India	46. Qatar
3. Australia	25. Ireland	47. Romania
4. Austria	26. Italy	48. Russia
5. Bahrain	27. Japan	49. Saudi Arabia
6. Belgium	28. Kuwait	50. Slovakia
7. Brazil	29. Laos	51. Slovenia
8. Bulgaria	30. Latvia	52. South Africa
9. Cambodia	31. Libya	53. South Korea
10. Canada	32. Liechtenstein	54. Spain
11. China	33. Lithuania	55. Suriname
12. Cyprus	34. Luxembourg	56. Sweden
13. Czech	35. Maldives	57. Switzerland
14. Denmark	36. Malta	58. Taiwan
15. Egypt	37. Mexico	59. Tunisia
16. Estonia	38. Monaco	60. Turkey
17. Fiji	39. Netherlands	61. United Arab Emirates
18. Finland	40. New Zealand	62. United Kingdom
19. France	41. Norway	63. United States of America
20. Germany	42. Oman	64. Timor Leste
21. Greece	43. Panama	
22. Hungary	44. Poland	

There are 14 Airports where on arrival visa is issued to visitors from above mentioned 64 countries.

Airports

- | | |
|--|--|
| 1. Adisutjipto in Yogjakarta (Yogjakarta) | 9. Juanda in Surabaya (East Java) |
| 2. Ahmad Yani in Semarang (Central Java) | 10. Minang Kabau in Padang (West Sumatera) |
| 3. Adi Sumarmo in Solo (Central Java) | 11. Ngurah Rai in Denpasar (Bali) |
| 4. El Tari in Kupang (Timor, East Nusa Tenggara) | 12. Polonia in Medan (North Sumatera) |
| 5. Halim Perdama Kusuma in Jakarta | 13. Sam Ratulangi in Manado (North Sulawesi) |
| 6. Hassanudin in Makasar (South Sulawesi) | 14. Selaparang in Mataram (Lombok, West Nusa Tenggara) |
| 7. Hang Nadim in Batam (Riau Islands) | 15. Sepinggan in Balikpapan (East Kalimantan) |
| 8. Husein Sastranegara in Bandung (West Java) | 16. Soekarno Hatta in Jakarta |

B. List of Countries entitled to Free Short Visit Visa to Indonesia

The maximum length of stay is 30 (thirty) days.

- | | |
|----------------------|--------------|
| 1. Brunei Darussalam | 9. Singapore |
| 2. Chile | 10. Thailand |
| 3. Hong Kong | 11. Vietnam |
| 4. Macau | 12. Ecuador |
| 5. Malaysia | 13. Cambodia |
| 6. Morocco | 14. Laos |
| 7. Peru | 15. Myanmar |
| 8. Philippines | |

C. List of countries required to obtain approval prior to entry into Indonesia.

- | | |
|----------------|----------------|
| 1. Afghanistan | 7. Niger |
| 2. Cameroon | 8. Nigeria |
| 3. Guinea | 9. North Korea |
| 4. Iraq | 10. Pakistan |
| 5. Israel | 11. Somalia |
| 6. Liberia | |

Yogyakarta TSOP Venue & Points of Interest

As a way of orienting participants, see the map below. The TSOP Annual Meeting will be held at the Hyatt Regency Hotel in Yogyakarta. We encourage participants to register early and book into the Hyatt where a number of rooms have been reserved. Check out the link given below the map for other attractions around Yogyakarta.



Source: <http://wikitravel.org/en/Yogyakarta>

TITANIC COAL

MaryAnn Love Malinconico
Lafayette College
Easton, Pennsylvania USA
carbonacea.blogspot.com

"A steady roar thundered across the water as everything moveable broke loose. There had never been a mixture like it—29 boilers . . . the jeweled copy of the Rubaiyat . . . 800 cases of shelled walnuts . . . 15,000 bottles of ale and stout . . . huge anchor chains (each link weighed 175 pounds) . . . 30 cases of golf clubs and tennis rackets for Spalding . . . Eleanor Widener's trousseau . . . tons of coal . . ."

Walter Lord, A Night to Remember (1955)

In April, we are coming up on the 103rd anniversary of the sinking of the *Titanic*. In 2007, I visited "*Titanic: the Artifact Exhibition*" at the Royal British Columbia Museum in Victoria, British Columbia, Canada, just before the start of the TSOP/ICCP meeting. The museum is in the first block south of the majestic Empress Hotel on the inner harbor of Victoria. (I followed up my early Friday evening time-ticketed exhibit visit with supper and cocktail on the veranda of the Empress.) The *Titanic*, of course, is the great British steamship, touted as "unsinkable", that, on its maiden voyage from England to New York, struck an iceberg in the North Atlantic late on Sunday night, April 14, 1912; it sank beneath the ocean surface a few hours later in the early morning of April 15. The traveling exhibit, both through passenger and steamship effects recovered from the seafloor, and through recreations of the ship's interior, told the story of the disaster, life on board, the variety of passengers and their reasons for sailing. The exhibit exited at a gift shop; I purchased a pendant that enclosed a small piece of *Titanic* coal from the seafloor. I thought that was an appropriate remembrance for me, being 1) a coal petrologist, and 2) born on April 15.

I had been aware that some of the coal from *Titanic* had been recovered and sold as part of the fundraising for *Titanic* recovery and research. Coal lumps, in fact, are the only recovered artifacts that have been ruled legal for sale since they are considered "natural" objects and not man-made (<http://law.lclark.edu/live/files/11855-lcb163art8zekala.pdf>). Although some online photos or details on certificates of authenticity (COA) indicate that coal lumps could be very large (≥ 3 kg), one photo taken in a *Titanic* coal bunker before sailing shows mostly fist-size coal. Smaller pieces sold, including

those in jewelry or crushed coal mounts, are taken from the larger pieces, and the COA for those specimens are, therefore, derivative. For example, the "object number" for the coal in my pendant is 94/0036: 1994 being the year of collection and 36 the sample number. A photo at <http://www.titanicautographs.com/products.php?product=Titanic-coal-recovered-from-the-ship-on-official-expedition> shows the original 94/0036 coal nodule recovered (my estimate of size: 30 cm x 25 cm x 10 cm), plus the COA with that sample number for a small coal fragment. However, a Google image search for just "*Titanic* coal" produces several offered coal fragments, with COAs of different styles, but the same 94/0036 number! Certainly, many small pieces could be derived from the large original nodule, but is the volume sum of marketed pieces greater than the original whole? The seller at the above link does mention concern with authenticity of the coal being offered.

Titanic could hold 6611 tons of coal in bunkers and an additional 1092 tons in Hold 3 (Hutchings and de Kerbrech, 2011). There are variable reports on how much coal was onboard at sailing. Sheehan and Sickels-Taves (2002) state just under 6000 tons; website http://atlanticliners.com/titanic_home.htm says 5892 tons. Essenhigh (2004) writes that the six bunkers were only half full with 800 tons each ($=4800$ tons). Smith (2005) cites a website (no longer active) that reported 4427 tons were in the bunkers; Palmer and others (2003) said "more than 4000 metric tons". Steam for the two steam engines and one steam turbine was produced in 29 boilers that contained 159 furnaces. Six hundred tons of coal/day were shoveled into the furnaces around the clock by a total complement of 176 firemen ((Hutchings and de Kerbrech, 2011). There were 73 coal trimmers who handled the coal from loading to maintenance in the bunkers and delivery to the firemen (http://en.wikipedia.org/wiki/Coal_trimmer). One hundred tons of coal ashes were disposed at sea each day (Hutchings and de Kerbrech, 2011). Sheehan and Sickels-Taves (2002) state that the *Titanic* sank with 2500 tons of coal out of the original load. Coal has been recovered from *Titanic* ocean bottom debris fields since 1987; coal in various studies and available for sale online is from expeditions in 1994 and 2000.

Based on testimony of surviving crewmen, there is good evidence for a coal fire in one of the bunkers at the time of sailing. Bunker fires were not uncommon on steamships, caused by spontaneous combustion within the piled coal. The usual solution to quell the fire was to sail at full speed to quickly shovel down the coal pile

until the smoldering coal could be removed by simply adding it to the furnaces. However, *Titanic* survivor reports are not consistent regarding 1) whether the fire started around the time of sailing from Southampton or earlier during sea trials in early April; 2) if the fire was out by Saturday, April 13, or still smoldering at collision; 3) if heat from the fire damaged the adjacent watertight bulkhead; and 4) in what bunker was the fire. Essenhigh (2004), calculating rate of fire spread versus coal pile drawdown, assumed the fire was probably in the top half of the bunker pile, however, Fireman John Dilley testified in 1912 that the fire was at the bottom of the coal pile. There are some, including Essenhigh (2004), who speculate that running full speed through the ice field on April 14 was not to break an Atlantic-crossing speed record but to get rid of the burning bunkered coal, assuming that the fire had not been extinguished the day before. The website <http://titanic-model.com/db/db-03/CoalBunkerFire.htm> discusses inconsistencies in quoted original testimony on the bunker fire from surviving crewmembers.

I was curious if any analysis of recovered *Titanic* coal had been undertaken. A 2012 discussion in an online *Titanic* forum mentions that an analysis of coal recovered in 1994 concluded there were 5 or more geographic coal sources including Pennsylvania anthracite. The "chat" also says that the technical analysis is no longer online (perhaps it is the same as the now-defunct website cited by Smith (2005)). I also could not find any such study that matches those results. However, there are available published scientific studies, using modest-size sample sets, by two groups of researchers. The earliest is by Michael Sheehan and Lauren Sickels-Taves (in 2002 at Eastern Michigan University) from their presentation at a symposium on materials issues in archaeology. The second group of authors (Palmer et al., 2003) presented their findings at both the 2002 Pittsburgh Coal conference and the 2003 TSOP annual meeting in Washington, DC.

Sheehan and Sickels-Taves, importantly, detail the historic background of coal labor and supply issues in the United Kingdom in spring 1912 that affected the availability and sources of coal loaded on *Titanic*. From February 22-April 6, 1912, ending just before the *Titanic's* sailing from Southampton, England, on April 10, there was a major UK coal strike that limited the national supply of coal. Some ship sailings were cancelled due to the strike. However, in preparation for the celebrated maiden voyage of *Titanic*, White Star Line, owner of the ship, scavenged leftover coal in

Southampton from other ships of the International Mercantile Marine trust, of which White Star was a member, or had ships already at sea take on extra coal in non-British ports. Sheehan and Sickels-Taves mention that extra coal sacks were even stockpiled in the Second Class public rooms of *Titanic's* sister ship, *Olympic*. It is important to note that coal had been already loaded on *Titanic* at Belfast for the sea trials (Smith, 2005); those coals, I assume, are British since there are few Irish coals and Belfast is close to major British coalfields across the Irish Sea.

Sheehan and Sickels-Taves examined 19 coal nodules that were recovered in 2000. They used samples made available to them. They state there was no scientific sampling plan in seafloor recovery, and, therefore, samples may not be representative of the actual range and distribution of coal types onboard. Fifty grams taken from each nodule were used for petrographic, palynological, and trace element analysis (latter data not reported). Testing was done by TES Bretby (formerly Scientific Services Division of British Coal), UK, and Virginia Polytechnic Institute (VPI), USA.

The range of mean vitrinite reflectance for the 19 samples is 0.99% to 2.28% ((British Standard 6127=ISO 7404-5). Fifteen samples are "medium or low volatile bituminous coals with reflectance values between 1.19-1.99%"; eight have reflectances between 1.65 and 1.76%. Only one sample has reflectance greater than 2%, the 2.28% R_o semi-anthracite sample. This range of maturity is consistent with the rank variation within the South Wales Coalfield, which it seems the authors assume is the primary British source of *Titanic* coal. One other reflectance data point is available for *Titanic* coal: a medium volatile bituminous 1.15% R_o from the only sample obtained by Smith (2005).

Three high volatile bituminous coals (0.99-1.09% R_o) of Sheehan and Sickels-Taves were submitted for palynological analysis. Results indicate all are Upper Carboniferous, but stratigraphic location within the British Coal Measures could not be determined. One sample, 7B (0.99% R_o) had a type of spore rare in British coals. The authors also say the rare spore type, not identified, is not common in the eastern USA, but speculate it is still possible the sample could be from an eastern US coal transported to Southampton by the *Olympic*.

Palmer and others (2003) examined 20 samples chosen by the RMS *Titanic*, Inc. curator because "each piece

appeared to be different". Their fixed carbon and volatile matter results indicated an equal distribution of low, medium, and high volatile bituminous coals among the samples. Ash yields are more consistent with British coals than US coals. Trace elements were analyzed by neutron activation, and results were compared to a data base of 24 British coals and 1450 US coals from beds that had been exploited in 1912. Rare earth element data "suggest. . . five distinct sources". Iron, potassium, and arsenic concentration range and median values are more similar to British coals. For most elements, however, the *Titanic* values were less than both US and UK coals, which the authors suggest is due to differences in the *Titanic* coal, mined in 1912, versus data base samples collected decades later from the same mine or seam.

Two of Palmer and others' samples yielded spores for palynological study. The authors list identified species of the spore assemblages which indicate a Langsettian (Westphalian A) age. They report that nearly all British coalfields contains such beds, but few US coals mined in 1912 were that age.

One research goal of Palmer and others was to determine the environmental effect of shipwrecked coal in a deep marine setting. In the *Titanic* samples, higher iodine and bromine than either US or UK coals suggests absorption of those elements from seawater; chlorine data indicates some leaching of that element from the coal. Otherwise the coals are unaltered, and there appears to be "minimal environmental impact" since 1912.

Both scientific studies conclude most coal samples examined were sourced in Britain. Sheehan and Sickels-Taves write that the limited *Titanic* sample set shows "considerable uniformity" consistent with usual British sources of coal used by White Star. Although it is known that ships like the *Olympic* onloaded extra coal from non-British ports during the 1912 strike, it does not appear, with the possible exception of their low-rank sample 7B, that non-typical coals were a significant portion of *Titanic* fuel. Palmer and others, using two different statistical methods, concluded that 12 samples are probably from the UK, three from US, but provenance of the other four cannot be clearly assigned.

With results indicating that some of *Titanic*'s coal may be from the United States, what were the typical US sources of coal for White Star Line ships? The *Coal and Coal Trade Journal* (vol. 22) wrote in May 23, 1883, that White Star Line renewed a contract with New Central Coal Company of Maryland to fuel their ships in

American ports. That company mined Carboniferous low volatile bituminous coal (http://pubs.usgs.gov/sir/2010/5152/pdf/sir2010-5152_fig2.pdf) in the western Maryland Georges Creek basin. I could not find if a contract continued to 1912. Ten years later, the *Colliery Engineer* (volume 14, August 1893) mentioned a White Star US contract alluding to a Pocahontas coalfield source (West Virginia/Virginia; medium to low volatile bituminous). *Gas World* (v. 20, March 31, 1894) also mentioned that White Star Line used Pocahontas coal. *Gas World* continued that Pocahontas was the preferred coal of the US Navy, and some steamships had set Atlantic crossing records using the same. They wrote that Pocahontas coal "is declared by a Newcastle analyst to be 'equal to the best Welsh steam coal, and excellent coal for steam-raising purposes.'" This still leaves questions, however, about the source of high volatile bituminous coals identified by both Sheehan and Sickels-Taves (their possible-US sample 7B) and Palmer and others.

The results of the scientific studies do call into question colliery source data or coal rank given on some of the *Titanic* coal COA and labels currently found online. As mentioned earlier, some labels state the rank is anthracite; one COA, without rank assignment, claims that the mine of origin is Six Bells Mine, South Wales Coal Fields, UK (closed since 1988). The study by Sheehan and Sickels-Taves clearly indicates that the exact mine of origin for a particular lump of coal cannot be ascertained with certainty even if the rank is determined. An included table by TES Bretby shows possible early 20th-century South Wales colliery associations for sample reflectance clusters. Most reflectances are correlated with more than one mine, although only the Lake Windsor colliery (Ynysybwl, Wales) is listed for the rank range of the eight 1.65-1.76% R_o samples. In addition, none of the studied coal, recovered in 2000, is, in fact, anthracite, but the limited number of samples does not rule out anthracite onboard.

"*Titanic: the Artifact Exhibition*" at Victoria was one of the itinerant exhibitions of RMS *Titanic*, Inc.; they have a permanent artifact exhibit now at the Luxor (pyramid-shaped casino) in Las Vegas. Another excellent exhibit of *Titanic* effects, mostly flotsam, is the permanent one at the Maritime Museum of the Atlantic in Halifax, Nova Scotia (<https://maritimemuseum.novascotia.ca/what-see-do/titanic-unsinkable-ship-and-halifax>). Maybe some of you visited the museum during one of Muki's well-organized TSOP meetings in Halifax. The flotsam was picked up at sea by both rescue-and-recovery and

commercial boats soon after the sinking. Copies of some items were incorporated into James Cameron's 1997 film, *Titanic*: a stairway newel post ornament like the one shot off the grand staircase, and an entryway entablature panel similar to what Kate Winslet floats on after the ship goes down (the real one is about half the size of the movie version). One hundred fifty victims of the *Titanic* sinking are buried in Halifax.

Essenhigh, R.H., 2004, What sank the *Titanic*? The possible contribution of the bunker fire (abs.): Geological Society of America Abstracts with Program, Vol. 36, No. 5, p. 42
(https://gsa.confex.com/gsa/2004AM/finalprogram/abstract_80510.htm)

Hutchings, D. and de Kerbrech, R., 2011, RMS *Titanic* Manual: 1909-1912 (Olympic Class): Haynes Owners' Workshop Manual Series, Zenith Press, 160 pages.

Palmer, C. A., Finkelman, R. B., Luttrell, G. H., Zhang, C., and Eble, C., 2003, The source of the coal in the *Titanic* and effects of exposure to seawater: Program and Abstracts for the 20th Annual Meeting of The Society for Organic Petrology, v. 20, p. 54-58.

Sheehan, M.S., and Sickels-Taves, L.B., 2002, The technological analysis of RMS *Titanic*'s Coal: The enhancement of archaeological research: Material Research Society Symposium Proceedings, vol. 712, p. 525-532 (Materials Issues in Art and Archaeology VI: Symposium held November 26-30, 2001, Boston, Massachusetts, USA).

Smith, A.H.V., 2005, Coal microscopy in the service of archeology: International Journal of Coal Geology, v. 62, p. 49-59.

+

Hardcover 272 pp; ~\$NZ60).

We all know that New Zealand is composed of two large islands (North and South) with Stewart Island just to the south of the South Island plus a plethora of other smaller islands (e.g. the Chatham Islands, Auckland Islands, Antipodes Islands and others). New Zealand has a total area of 269,021 km², about the size of Wyoming which is 253,348 km². Although somewhat isolated within the southern Pacific Ocean, all of these islands are predominantly composed of continental crust. But what hasn't been realised is that this continental crust extends, albeit submerged, for large distances in many directions (see Figure 1). By all measures, except that it is largely submerged, this ~ 4 million km² area would clearly be termed a continent.

You can almost feel the Australians cringe – and in a few Australian reviews I've noted that they do, - mostly unfairly I believe.

The book makes a good and well presented case that New Zealand should be seen as *Zealandia*, the continent. For the most part their arguments are sound, although there is one conspicuous discussion which is absent. The far northwest part of Zealandia very nearly connects with Australia. The interpretation of this gap between the continents is not referred to nor discussed. It seems to me that the authors may be avoiding such a point because if it could be demonstrated that there were no oceanic crust between the two, then perhaps Zealandia really is just an extension of the Australian continent, and thus: hello Canberra rule! As a New Zealander myself, this wouldn't be such a palatable outcome. The book is beautifully produced and well written. It is intended both for the layperson interested in geology as well as the expert. Breakout panels throughout the book help to explain some key concepts in simple terms with a minimum of jargon.

The book does come across as quite parochial in the sense that just about all the credit for any geological research is given only to scientists from the organisation GNS Science (the producers of the book and the primary affiliation of the first author and past employer of the second author). The book seems to randomly give photographs of GNS scientists just for the purpose of showing someone from GNS. Other New Zealand research organisations and universities have contributed hugely to the understanding of the geology in this region and yet they get virtually no mention. Ultimately this sort of bias devalues the book.

Book Review

Zealandia: Our Continent Revealed

Tim A. Moore
Cipher Consulting Ltd., Brisbane, Australia

Its not every day that a new continent is found. But that is exactly what authors Nick Mortimer and Hamish Campbell are writing about in their relatively newly published book "*Zealandia: Our Continent Revealed*" (Penguin Books New Zealand/GNS Science, 2014

A second distraction that also ultimately acts as a detriment to the overall book is that it quite overtly pushes the theory that New Zealand was completely submerged during the Oligocene. This, it becomes apparent, is a special hobby horse of the second author. A special volume of the New Zealand Journal of Geology and Geophysics (2014, volume 57) dispels just about any hope of a complete submergence, but these results, as well as others, are completely ignored. The omission of both sides to this argument is a discredit to the authors who are both well known and well regarded in New Zealand.

On the whole, I would recommend other books on New Zealand geology before this one. But despite its short comings it does present an interesting idea but one that really needs to be further tested, discussed and evaluated by experts in the field, not a limited few within a single organisation.

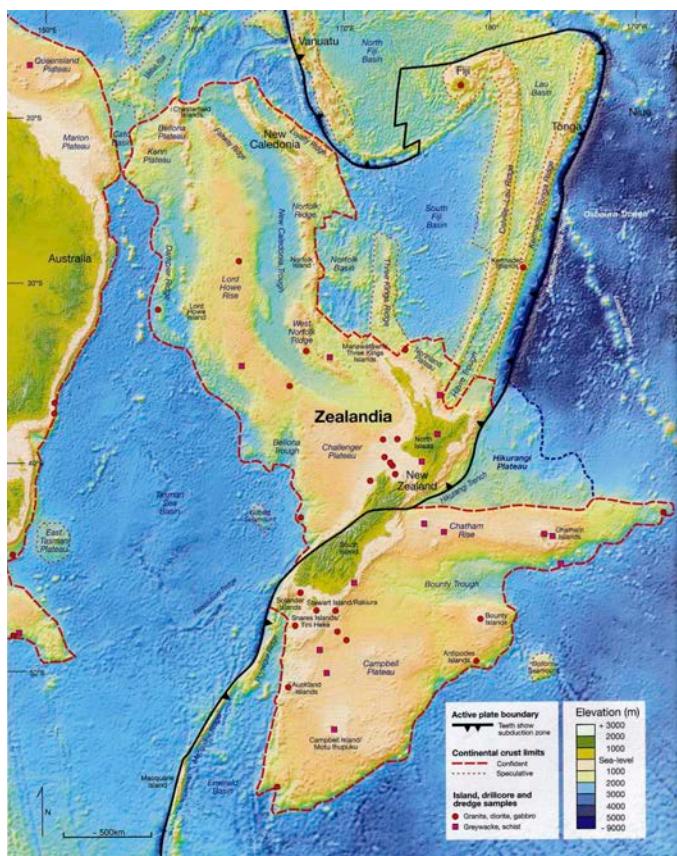


Figure 1: Outline of the proposed Zealandia continent.



Petrology is a specialty section of the Open Access journal, *Frontiers in Earth Science*.

The section of Petrology focuses on studies of igneous and metamorphic rocks. As the solid Earth is largely made of these rocks, petrology has become the tool to understand how the Earth works at all scales: from elemental redistribution on microscopic scales to plate tectonics and mantle convection on a whole-earth scale; taking place on land, beneath oceans and in the earth's deep interiors. The Petrology section welcomes papers concerning the petrogenesis of igneous and metamorphic rocks with new observations, new data, novel approaches, and importantly new insights through studying natural rocks and carrying out experimental and computational simulations.

We also welcome papers on planetary petrology. Our ultimate goal is to develop the specialty of Petrology in *Frontiers in Earth Science* into a global friendly platform for authors, reviewers and readers for efficient communication and for advancing our science, the petrogenesis of igneous and metamorphic rocks and its effective use, as a means of answering questions on how the Earth works.

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Queries should be directed to: earthscience.editorial.office@frontiersin.org

China Geological Survey Proved the Existence of an Extra-large Coal-associated Lithium Deposit

SUN Yuzhuang

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The most Li deposits were found in lake waters or igneous rock. In recent years, anomalous concentrations of lithium in coal have been reported by several coal geologists (Sun et al., 2010, 2012a, 2013a; Dai et al., 2012). Some coal geologists argued that these concentrations have economic significance (Sun et al., 2012b, 2013b, 2014). This discovery has even been reported by Khanchuk et al. (2013) in “The Newsletter of Society for Organic Petrology”, and the report was reprinted by the Geospectrum of the American Geosciences Institute (Geospectrum, 2014). However, before 2013, it has not been proven whether it is only a local concentration of lithium or an enriched coal-associated lithium deposit.

From 2012 to 2013, China Geological Survey established a project (Resource exploration of lithium and gallium in Pingshuo District, Shanxi Province) to investigate lithium enrichment in the Pingshuo coal. The project was completed by The Special Exploration Team of China Coal Geological Survey.

The study area of the project, Pingshuo mine district, covers an area of 396 km². The total coal reserves reaches up to 13 billion tons. A total of 835 coal samples were taken from the Pingshuo (Pinglu-Shuoxian) Mining District in northern China. The highest Li and Ga contents reach 960 and 68 mg/kg, respectively. According to the Geology and Ore Deposit Standard Specifications for Rare Metal Mineral Exploration of the People's Republic of China (DZ/T 0203-2002), Li and Ga contents have reached a level of associated Li and Ga deposits in the Pingshuo mine district. The total Li reserves reached 1072500 tons and total Ga reserves reached 165200 tons. Both of them belong to extra-large deposits (Sun et al., 2013). The Li concentration is mainly related to inorganic matter. The minerals in the coals consist of kaolinite, boehmite, chlorite-group mineral, quartz, calcite, pyrite, siderite and amorphous clay material. Some Li could be absorbed by clay minerals in the Li-bearing coal seam. The chlorite phase could be most likely the host for a part of Li. The Yinshan Oldland significantly influenced the sedimentation of the basin and could be the

most possible source of Li of the coal.

On 26 November 2013, China Geological Survey organized a group of coal geologists and ore deposit scientists to evaluate the project. They have concluded that both Li and Ga have enriched extra-large coal-associated deposits. This is the first proven coal-associated lithium deposit in the world.

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March 3, 2015

Dear Member Society President/Executive Director/Council Representative,

As part of the American Geosciences Institute's mission to bring together the wide array of geoscientists, we see EARTH Magazine as a means to relate the breadth of the science to everyone in our community. To this end, we seek your help in offering a free 90-day (3 issues) digital trial to EARTH Magazine for your members. As you are probably aware, AGI has published EARTH since 1956 (formerly Geotimes until 2008) and, now with the U.S. publishing landscape shifting rapidly to digital, we are in a position to offer three months of the digital edition of EARTH FREE to all the geoscientists belonging to our 50 member societies.

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Sincerely,



P. Patrick Leahy, Ph.D.
Executive Director

CALENDAR OF EVENTS

www.tsop.org/cal.htm



2015

April 17th: Ohio Valley Petrographers' Meeting, Bloomington, Indiana, USA

April 20-24: 27th International Applied Geochemistry Symposium. Tucson, Arizona, USA
<http://www.27iags.com/>

May 4-7: World of Coal Ash Conference, Nashville, Tennessee, USA. www.worldofcoalash.org/

May 31 – June 3: AAPG Annual Convention & Exhibition. Denver, Colorado, USA.
www.aapg.org/events/conferences/ace

August 16-21: 25th Anniversary Goldschmidt Geochemistry Conference, Prague, Czech Republic.
<http://goldschmidt.info/2015/index>

September 20 – 26: 32nd Annual TSOP Meeting, Yogyakarta, Indonesia. See website for details! <http://tsop2015.ugm.ac.id/>

October 5-8: 32nd Annual International Pittsburgh Coal Conference, Pittsburgh, PA, USA.
www.engineering.pitt.edu/pcc/

November 1-4: Geological Society of America Annual Meeting, Baltimore, Maryland, USA.
www.geosociety.org/meetings/2015/



Please send in meeting, short course and special event announcements to the Editor!

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calendar.agiweb.org/index.htm**



JOINT MEETING TSOP - AASP - ICCP

The Society for Organic Petrology, AASP-The Palynological Society
and the International Commission for Coal and Organic Petrology

September 18 – 23, 2016
Houston, Texas USA
FIRST CIRCULAR

We are pleased to present the initial announcement regarding this first historic joint meeting of these three related geological, geochemical and biological scientific societies. The purpose of this joint meeting is to bring together a diverse group of scientists to discuss the close relationships between organic petrology and palynology, to foster thoughtful discussion and address issues that may be of benefit to furthering the respective sciences. Key themes to be addressed during joint activities include palynofacies and source rock assessment.

The venue for this meeting will be the historic Magnolia Hotel in downtown Houston. The Magnolia was built in 1926 as the former Post-Dispatch Building. It was re-purposed in 2003 as The Magnolia Hotel, and further underwent a significant upgrade in 2009. The hotel is centrally located in downtown within walking distance of excellent restaurants and pubs. Over the past several years downtown Houston has undergone a major revitalization with many new office buildings, exciting arts and entertainment venues, and several world-class restaurants. We believe the downtown will provide exciting possibilities for every need and want.

The meeting will begin with TSOP and ICCP technical sessions and commission meetings on Monday and Tuesday, sessions for all three societies on Wednesday, and sessions and commission meetings for ICCP and AASP on Thursday and Friday. Each of the societies will have ample opportunity to conduct their needed business meetings. Social activities are also being planned accordingly, although a couple of evenings will be open to allow members to enjoy the nightlife of downtown Houston. The Conference Dinner for all attendees is being planned for Wednesday evening and will showcase views of the area skyline.

Houston is a significant transportation hub and the international airport (IAH) is serviced by all major airlines from Europe and Asia. Both airports (IAH and HOU) are serviced by the major US-based airlines. Transportation to and from the hotel area from both airports is available via taxi, shuttle, and MetroBus. Further information on fares and routes will be distributed in later circulars. Our current negotiated room rate at The Magnolia hotel is US\$179/night (single occupancy). Double- and triple- occupancy will be priced accordingly. This room-rate includes a complimentary hot breakfast, a late afternoon happy hour (complimentary beer/wine), a complimentary bedtime cookie buffet, and free internet.

The local Organizing Committee consists of Thomas Demchuk (ConocoPhillips), Jen O'Keefe (Morehead State U.), Thomas Gentzis (Core Laboratories) and Joe Curiale (Chevron). Over the next several months we will do our best to keep the societies and membership informed of new events and deadlines. In the very near future we will be soliciting ideas and potential speakers for our joint technical sessions. We look forward to a great joint meeting in September of 2016.

2015 Graduate Student Grant Program Spackman Award

The Society for Organic Petrology (TSOP) invites applications for graduate student research grants, the Spackman Award. The purpose of the grants is to foster research in organic petrology (which includes coal petrology, kerogen petrology, organic geochemistry and related disciplines) by providing support to graduate students from around the world, who demonstrate the application of organic petrology concepts to research problems.

Size of the Spackman Award:

Monetary awards up to a maximum of \$1,000.00 US will be granted. All applicants are invited to apply for a year's free Student Membership in TSOP.

Use of the Spackman Award:

Grants are to be applied to expenses directly related to the student's thesis program, such as fieldwork, laboratory analyses, etc. A portion (not to exceed 25%) of the funds may be used to attend TSOP Annual Meetings. Funds should **not** be used to purchase capital equipment, to pay salaries, tuition, room, or board during the academic year.

Funds must be spent by the end of the calendar year following granting of the award, and an account of expenditure with copies of receipts should be provided by the end of that year (December 31, 2016 for awards granted in 2015).

Review and Ranking of Applications:

A committee of at least three TSOP members (and/or external experts when needed) will review the pool of applications. The reviewers will be drawn from people having no association with the host institution of any applicant. Each reviewer will independently rank each proposal according to established merit criteria, using the Application Evaluation Form included in the application packet. The cumulative score from all of the reviewers will be used to determine the final ranking of the applications. Winners will be notified prior to the 2015 Annual Meeting, and all applicants will be informed by e-mail of the final status of their applications.

Application Deadline:

TSOP Spackman Award application deadline is **May 31, 2015**. Grants will be awarded in September, 2015.

Detailed information and an application form are under "Students" on the TSOP web site:
www.tsop.org/grants.htm

Application packages may also be obtained from:

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