



**Rio de Janeiro, Ouro Preto, and Porto de Galinhas • Brazil**  
**UNDERWATER MINING INSTITUTE**

## **FINAL PROGRAM**

**21 October 2013 (Monday)**

### **WELCOMING PARTY**

(ROOF TOP RECEPTION & REGISTRATION)

Windsor Plaza Hotel - Copacabana

Avenida Princesa Isabel

263 – Copacabana, Rio de Janeiro

Tel: +55 21 2195 5500

**19:00 – 21:00**

*UMI participants and guests are welcome.*

---

**22 October 2013 (Tuesday)**

### **TECHNICAL SESSION I**

Windsor Plaza Hotel - Copacabana

Avenida Princesa Isabel

263 – Copacabana, Rio de Janeiro

Tel: +55 21 2195 5500

**08:30 – 17:30**

*Participants staying at the Windsor Plaza or Windsor Excelsior should enjoy breakfast before coming to the conference room.*

**08:30 INTRODUCTION**

#### **Call to Order**

*Charles L. Morgan*

*UMI Program Chair*

**Welcome and Keynote Address (08:40)**

#### **“The Brazilian Geological Program in the South Atlantic”**

*Roberto Ventura Santos*

*UMI Program Co-chair and Host*

*Director, Geology and Mineral Resources*

*Geological Survey of Brazil (CPRM)*

*Brasilia, Brazil*

**Keynote Address (09:00)**

**“Deep-sea Mining Activities of the Republic of Korea:  
Recent Achievements and Future Challenges”**

*President Jung-Keuk Kang*

*Korea Institute of Ocean Science and Technology (KIOST)*

*Ansan, Korea*

**Presentations**

**09:20 Not Your Father's AUV: New Technologies That Will Transform Deep Sea Operation**

*Carl Kaiser*

*Woods Hole Oceanographic Institution, Massachusetts, United States*

**09:45 Deep Sea Mining Concept for Manganese Nodules**

*Steffen Knodt (alternate speaker, Annemiek Vink, BGR)*

*Aker Solutions Drilling Technologies, Erkelenz, Germany*

**10:05 Nodule Abundance Estimation – The Search for “Good Enough”**

*Laurie Meyer*

*Deep Reach Technology, Inc., Houston, Texas, United States*

---

**10:35 Break – 30 minutes**

---

**11:05 Pilot Mining Robot for Polymetallic Nodules**

*Sup Hong*

*Korea Institute of Ocean Science and Technology (KIOST),*

*Ansan, Korea*

**11:30 A Study on Steering Characteristics of Pilot Mining Robot (MineRo II) on Extremely Cohesive Soft Soil**

*Hyung-Woo Kim*

*Korea Institute of Ocean Science and Technology (KIOST),*

*Ansan, Korea*



**11:50 Control and Monitoring of Hydraulic System of Underwater Mining Robot**

*Tae-Kyeong Yeu*

*Korea Institute of Ocean Science and Technology (KIOST), Ansan, Korea*

---

**12:15 Lunch (1 hr 15 min)**

---

13:30 Poster Session (45 minutes)

## Poster Presentations



### **Past, Present and Future of Mn-nodules Development of Korean the NE Equatorial Pacific**

*Sang Bum Chi*

*Korea Institute of Ocean Science and Technology (KIOST), Ansan, Korea*

### **A Classification Society Experience with Subsea Mining**

*Marco Figoni*

*American Bureau of Shipping, Rio de Janeiro, Brazil*

### **Hydrothermal Activity Along the Central Spreading Ridge of North Fiji Basin: Results from 2012-2013 Explorations**

*Jonguk Kim*

*Korea Institute of Ocean Science and Technology (KIOST), Ansan, Korea*

### **Suitable Site Selection for Manganese Nodule Development in the Korea Licensed Area Using GIS Method**

*Young-Tak Ko*

*Korea Institute of Ocean Science and Technology (KIOST), Ansan, Korea*

### **Geological Setting of an Off-axis Mafic-hosted Seafloor Hydrothermal Field (14° S, MAR) and Its Influence on Associated Deposits Formation**

*Bing Li*

*First Institute of Oceanography, State Oceanic Administration*

*Qingdao, China*

### **From Exploration to Extraction: The Consequence of Resource Morphology for Mining Operations on the Chatham Rise**

*Campbell McKenzie*

*Kenex Limited, Eastbourne, Wellington, New Zealand*

### **The Approach to Environmental Impact Assessment for Mining Seafloor Massive Sulfides in Japan - DNA Analysis for Biodiversity Conservation by the Genetic Connectivity Concepts**

*Narita Teruyoshi (alternate speaker: Nobuyuki Okamoto)*

*Japan Oil, Gas and Metals National Corporation, Tokyo, Japan*

### **Sub-seafloor Replacement Mineralization: Lessons from the Neves Corvo VHMS Deposit**

*Jorge Relvas*

*University of Lisbon, Lisbon, Portugal*

### **Managing Deep Sea Tailings Placement and the Environment: An Analogue for Deep Sea Mining**

*Tracy Shimmiel*

*Scottish Association for Marine Science Research Services Limited (SRSL), Argyll, Scotland, United Kingdom*

**Scientific Deep Water Drilling Results and Their Application for Underwater Mining**

*Giovanni Spagnoli*

*BAUER Maschinen GmbH, Schrobenhausen, Germany*

**The Mineralogy and Isotope Geochemistry of Active Hydrothermal Field at South Atlantic Mid-Ocean Ridge 15°S**

*Jun Ye*

*First Institute of Oceanography, State Oceanic Administration, Qingdao, China*

**Oral Presentations - continued**

**14:15 Estimating and Finding Seafloor and Sub-seafloor Sulfide Mineralization: Optimists Versus Pessimists**

*Fernando Barriga*

*University of Lisbon, Lisbon, Portugal*

**14:35 AUV-based Long-range Exploration for Hydrothermal Activity Between 13°- 33°S along the Southern Mid-Atlantic Ridge**

*Sven Petersen*

*GEOMAR, Helmholtz Centre for Ocean Research, Kiel, Germany*

**14:55 New Morphological Insights of the Fieberling Guyot, Northeast Pacific Ocean: Application of SeaBat 7150 for Underwater Mining**

*Brian Parsons*

*Odyssey Marine Exploration, Tampa, Florida, United States*

**15:15 Marine Minerals and Energy Resources Research Works in KIGAM: Manganese Nodule and Gas Hydrate**

*Sung Rock Lee*

*Korea Institute of Geoscience & Mineral Resources (KIGAM), Daejeon, Korea*

---

**15:35 Break (30 minutes)**

---

**16:05 Preliminary Economic Evaluation of Deep-sea REE Mud Mining**

*Tetsuo Yamazaki*

*Osaka Prefecture University, Osaka, Japan*

**16:25 Waste Rejection on Seafloor by Slurry Flashing for Economic Seafloor Massive Sulfide Mining**

*Yuta Yamamoto*

*Osaka Prefecture University, Osaka, Japan*

**16:45 Electromagnetic Methods in Seafloor Mineral Exploration: Past Experiences, Present Technology and Future Directions**

*Andrei Swidinsky*

*Colorado School of Mines, Golden, Colorado, United States*

**17:05 The Application of Current Benthic Assessment Expertise to the Marine Mining - A Perspective on Best Practice from the UK**

*Daniel Brutto*

*Marine Ecological Surveys, Limited, United Kingdom*

**17:30 Technical Session I Closing Remarks**

*Charles Morgan*

---

**22 October 2013 (Tuesday)**

**EVENING ACTIVITIES**

The evening is free for participants to explore the Copacabana.

See the list of restaurants below for suggested dining locations.\*

An optional activity for UMI participants is the **RIO SCENARIUM**—*considered to be among the Best 10 Bars in the World and to have the Best Live Music in Rio.*

Entry Fee: About USD 12.00 per person per show

Website: [www.rioscenarium.com.br](http://www.rioscenarium.com.br)

**Address:**

**Rua do Lavradio, 20 – Old Town, Rio de Janeiro**  
(near Praca Tiradentes)

Tel: +55 21 3147-9005



**Two Different Shows: 19:30 and 23:00**

We have reserved 40 seats for the 1<sup>st</sup> show. Please sign up with the UMI receptionist by 12:00 Noon on Tuesday, October 22. The first show features Ana Costa (singer) and musicians performing hits by Brazillian composers. Please take a taxi and **meet at 19:00** at the Rio Scenarium.

The 2<sup>nd</sup> show highlights Darcy Wonder, a champion in samba. Many talented musicians will be featured.

Please check with conference coordinators at the UMI in case there are any slight changes regarding this activity.

**\*Recommended Places to Eat** (close to hotel)

- Restaurant do Windsor Plaza Hotel – a la carte or buffet (*according to recent TripAdvisor review “service in this dining room is excellent and the buffet is quite good.”*)
- Cervantes, Tel: 21 2275-6147, Av. Prado do Junior no. 335B (*fresh and delicious sandwiches, salads, various meats, fish, beer, wine, desserts*)
- Brasileirinho, Tel: +55 21 2523-4994, R. Jangadeiros, 10 - Ipanema (*fine dining, “service was impeccable.”*)
- Shirleys, Tel: 21 2275-1398, Rua Gustavo Sampaio 620, RJ (*hole-in-the-wall Spanish seafood restaurant, quaint, “food is definitely worth the trip” according to Frommer’s review*)
- Cerretao, Tel: 21 2236-3435, Siqueira Campos Street, 23 (*modern, relaxed, close to the beach, carefully prepared cuisine “tasty and irresistible.”*)
- Martinez, Tel: 21 3215-7297, Loja B - Avenida Atlântica, 974 – Leme (*wide variety of appetizers, along with baked and grilled dishes, some original and some classic... “a great place to eat overlooking the beach” according to a TripAdvisor review.*)

**23 October 2013 (Wednesday)**

**TECHNICAL SESSION II**

Windsor Plaza Hotel - Copacabana

Avenida Princesa Isabel

263 – Copacabana, Rio de Janeiro

Tel: +55 21 2195 5500

**08:30 – 17:00**

*Participants staying at the Windsor Plaza or Windsor Excelsior should enjoy breakfast before coming to the conference room.*

**UMI**

**2013 Spouses Tour:** Concurrent with Session II is traditionally a trip planned for spouses and guests to enjoy special features of the city that we are visiting. Please see Karynne, Michelle or any of the receptionists to formalize a trip, or to make suggestions on where to go and what to see in Rio.

**08:30 International Marine Minerals Society: Annual General Membership Meeting**

*James R. Hein, President*

**Presentations**

**09:00 Toward Zero Impact: Assessment of Ecological Impact for Tailings Return**

*Wiebe Boomsma*

*IHC Mining BV, Kinderdijk, Netherlands*

**09:20 Tierra Del Fuego: A Southern Equivalent of Nome, Alaska**

*Richard Garnett*

*Minera Mares Australes, Santiago, Chile*

**09:40 Ultra-fast Segmentation and Quantification of Poly-metallic Nodule Coverage in High-resolution Digital Images**

*Tim Nattkemper*

*Biodata Mining Group, Biefeld University, Biefeld, Germany*

**10:00 Critical Metals in Manganese Nodules from the Cook Islands EEZ**

*James R. Hein*

*U.S. Geological Survey, Santa Cruz, California, United States*

-----  
**10:20 Break (30 minutes)**  
-----

- 10:50 Fe-Mn Nodules of the Finnish Bay (Baltic Sea): Exploration and Exploitation Experience**  
*George Cherkashov*  
*VNIIOkeangeologica, St. Petersburg, Russia*
- 11:10 Geoacoustic and Photo-Profiling as Remote Techniques of Choice in Nodule Field Exploration**  
*Ivo Dreiseitl*  
*Interoceanmetal Joint Organization, Szczecin, Poland*
- 11:30 Methods of Manganese Nodule Exploration in the German License Area**  
*Carsten Ruehleemann*  
*Federal Institute for Geosciences and Natural Resources (BGR), Hannover, Germany*
- 11:50 Geological Limitation on Distribution of Manganese Nodules in the South China Sea**  
*Huaiyang Zhou*  
*Tongji University, Tongji, China*
- 12:10 Revisiting the DISCOL Area in the Peru Basin 25 Years After the Disturbance Experiment - A German/European Initiative to Prepare an Environmentally Sustainable Manganese Nodule Mining**  
*Andrea Koschinsky-Fritsche*  
*Jacobs University, Bremen, Germany*

---

**12:30 Lunch (1 hr 30 min)**

---



- 14:00 Polymetallic Nodules in the Cook Islands EEZ - A Seabed Mineral Resource of World Class Significance - Progress Towards Ultimate Development**  
*Darryl Thorburn*  
*Seabed Minerals Authority, Rarotonga, Cook Islands*
- 14:20 Distribution of Radionuclides During Weathering and Erosion in Saquarema (Rio de Janeiro): Implications for Submerged Monazite Deposits in Adjacent Offshore Area**  
*Valiya Hamza*  
*National Observatory of the Ministry of Science & Technology, Rio de Janeiro, Brazil*
- 14:40 Nautilus Minerals Exploration and Development Update**  
*John Parianos*  
*Nautilus Minerals, Inc., Brisbane, Australia*
- 15:00 Monitoring the Dynamics of Gas Hydrate Deposits and Hydrothermal Discharge using the NEPTUNE Undersea Observatory Network**  
*S. Kim Juniper*  
*Ocean Networks Canada, British Columbia, Canada*

---

**15:20 Break (30 minutes)**

---



**15:50 Seabed Classification at Seafloor Hydrothermal Sulfides Fields Using Multi-beam Sonar**

*Chunhui Tao*

*Second Institute of Oceanography, Hangzhou, China*

**16:10 A Review of Radiometric Dating Methods Used in Assessing Submarine Volcanic Arc-related Mineral Deposits**

*Robert Ditchburn*

*GNS Science, Lower Hutt, New Zealand*

**16:30 North Atlantic Marine Minerals and Ocean Mining Potential**

*Fredrik Soreide*

*Norwegian University of Science and Technology, Trondheim, Norway*

**16:50 Trace Elements in Massive Sulfides from the Semenov-2 Hydrothermal Field, 13°31' N, Central Atlantic: ICP-MS and LA-ICP-MS Data**

*Irina Melekestseva*

*Institute of Mineralogy, Ural Branch, Russian Academy of Sciences, Miass, Russia*

**17:10 Closing Remarks**

*Roberto Ventura Santos and Charles Morgan*

**Invitation to UMI 2014 in Lisbon, Portugal**

*Fernando Barriga and Jorge Relvas*

*University of Lisbon, Portugal*

**End of Technical Sessions**

*Charles Morgan*

---

**23 October 2013 (Wednesday)**

**UMI 2013 BANQUET**

**18:30**

Fogo de Chao (fo-go-dee shoun) is an authentic Brazilian steakhouse showcasing the gaucho way of preparing meat in Southern Brazil. Sixteen cuts of meat are expertly grilled and offered continuously at your table. Graced with gourmet salads, imported cheeses and Brazilian side dishes, this will be a UMI banquet to savor for years to come. Your UMI registration includes the dinner. Wine and other specialty drinks are considered no-host cocktails.



Transport from your hotel to the restaurant is best by taxi (about Real\$ 12 cash). If needed, please ask the hotel for assistance in selecting your taxi service.

Fogo de Chao

Rio De Janeiro

Av. Reporter Nestor Moreira, s/n – BotaFogo

Tel: +55 21-2279-7117

**24-26 October 2013 (Thursday, Friday, and Saturday)**

**UMI GEOTECHNICAL FIELD TOUR**

**Ouro Preto Area, Brazil**

Director Roberto Ventura Santos and his staff from the Geological Survey of Brazil (CPRM) have arranged for a unique geotechnical tour to the Ouro Preto area, famous for mining and other geologically significant features. CPRM specialists will provide guidance and expertise on the activities of the area. Participants should wear outdoor attire (light trousers, light sweaters, and walking shoes). The temperature will be moderate with the possibility of rain.

Oct 24: Shuttle from hotel lobby to Santos Dumont Airport (SDU); depart SDU at 07:58 and arrive Belo Horizonte (CNF) at 09:11; technical tour group to iron mine and non-technical tour group to Ouro Preto town; check in at various hotels; dinner on your own.

Oct 25: Breakfast in the hotel. Technical members splits into 3 groups (Cuiaba, Passegem, Komatiite outcrops); non-technical group depart for Inhotim contemporary art museum; check in at hotel; dinner on your own.

Oct 26: Breakfast in the hotel. Various departures from CNF to SDU and from CNF to REC (Recife) for Industry Strategic Planning Meeting in Porto de Galinhas.

*The most current and detailed information will be provided at the UMI for all participants on the Field Tour.*

**Field Tour members as of 10/15/13: 52 persons**

Brad Baker	Jai-Woon Moon
Fernando Barriga and Celia Lee	Charles and Karynne Morgan
Wiebe Boomsma	Mark Mussett
Craig Bryson	John Opperman and Susan Helms
Georgey Cherkashov	John and Nicola Parianos
Sang Bum Chi	Brian Parsons
Daniel De Narvaez & Marisol Espinosa	Jorge Relvas
Tom Dettweiler	Carsten Ruehlemann
Robert Ditchburn	Caroline Scogna
Richard Garnett	Robina Sharpe
Robert Goodden & Beatrice Brandt	Tracy Shimmield
James Hein	Chunhui Tao
Sup Hong	Satoshi Ueda
Jiancai Jin	Annemiek Vink
Jonguk Kim	John Wiltshire
Hyung Woo Kim	Changbin Wu
Young-Tak Ko	Xuwei Xu
David Kronenberg	Yuta Yamamoto
Sung Rock Lee	Tetsuo Yamazaki
Li Li	Ning Yang
Shaojun Liu	Jun Ye
Paul Lynch	Tae-Kyeong Yeu
Irina Melekestseva	Huaiyang Zhou

**26-29 October 2013 (Saturday - Monday)**  
**INDUSTRY STRATEGIC PLANNING MEETING**  
**Porto de Galinhas**



*More details will be provided at the UMI.*

**Participants as of 10/15/13:**

Brad Baker	Jorge Relvas
Fernando Barriga (Celia Lee)	Frederico Rodrigues
Tim Boyd	George Satander de Sa Freire
Craig Bryson	Caroline Scogna
Max Cohen (Lisa Cohen)	Robina Sharpe
Daniel De Narvaez (Marisol Espinosa)	Tracy Shimmield
Kaiser De Souza	Hans Smit (Andrea Smit)
Tom Dettweiler	Greg Stemm (Laurie Stemm)
Karsten Ewald	Nicholas Stemm
Robert Goodden (Beatrice Brandt)	Andrey Swidinsky (Viktorya Pavelko)
Chuck Drake	Chunhui Tao
Jiancai Jin	Ernie Tapanes (Julie Tapanes)
Jeff Knight	Darryl Thorburn
David Kronenberg	Roy Truman
Shaojun Liu	John Wiltshire
Paul Lynch	Changbin Wu
Valdir Manso	Xuewei Xu
Laurie Meyer (Michael Meyer)	Yuta Yamamoto
Charles Morgan (Karynne Morgan)	Tetsuo Yamazaki
Kris van Nijen	Jun Ye
John Opperman (Susan Helms)	Huaiyang Zhou
John Parianos (Nicola Parianos)	

**29 October 2013**

**Adjournment of UMI 2013**

UMI Participant and Friend:

We hope you will enjoy yourself and benefit professionally

And personally from your time with us at the 42<sup>nd</sup> Underwater Mining Institute in Brazil. Please join us in extending our appreciation to our host, Dr. Roberto Ventura Santos and his executive assistant, Michelle Araujo, and others on his technical and administrative team for their excellent hosting of the Institute. We would like to express our gratitude also to CEO Greg Stemm and his Odyssey Marine Exploration team for their support of the UMI and for hosting our first Industry Strategic Planning Meeting. And to all of our Sponsors for their trust and support, we say *Mahalo*:

- Odyssey Marine Exploration
- Geological Survey of Brazil
- Technip-France
- IHC Mining BV
- Japan Oil, Gas and Metals National Corporation (JOGMEC)
- Korea Institute for Ocean Science & Technology (KIOST)
- International Marine Minerals Society
- Nautilus Minerals, Inc.
- James R. Hein
- Georgy Cherkashov
- Hawaii Undersea Research Laboratory, University of Hawaii
- Marine Technology Society

*Charles L. Morgan*

UMI Chair

*James R. Hein*

IMMS President