

Catalogue of the main gas manifestation of Greece: a basis for nationwide estimations of gas hazard and total geogenic gas output

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Like other geodynamically active areas, Greece is affected by a large number of geogenic gas manifestations. These occur either in form of point sources (fumaroles, mofettes, bubbling gases) or as diffuse emanations. We produced a catalogue of the geogenic gas manifestations of Greece also considering few literature data. Collected samples were analysed for their chemical (He, Ne, Ar, O₂, N₂, H₂, H₂S, CO, CH₄ and CO₂) and isotopic composition (He, C and N). Geogenic gases, apart from having important influences on the global climate, could have strong impact on human health. Gas hazard is often disregarded because fatal episodes are often not correctly attributed. Geodynamic active areas release geogenic gases for million years over wide areas and the potential risks should not be disregarded. A preliminary estimation of the gas hazard has been made for the last 20 years considering the whole population of Greece. In this period at least 2 fatal episodes with a total of 3 victims could be certainly attributed to CO₂. This would give a risk of 1.3×10^{-8} fatality per annum. Such value, probably underestimated, is much lower than most other natural or anthropogenic risks. Gas output estimations are at present available only for a few of the gas manifestations. This catalogue will be basis for the estimation of the total geogenic gas output of Greece through extensive flux measurements.



DEEP CARBON OBSERVATORY

***SECOND INTERNATIONAL
SCIENCE MEETING***

26–28 March 2015

Deutsches Museum



Munich, Germany

PROGRAM COMMITTEE

Craig Manning, Program Committee Chair

DCO Executive Committee and DCO Extreme Physics and Chemistry Community Scientific Steering Committee, University of California Los Angeles

Donald Dingwell, Local Host

DCO Executive Committee, Ludwig Maximilian University

Magali Ader

DCO Deep Energy Community Scientific Steering Committee, Institut de Physique du Globe de Paris

Liz Cottrell

DCO Reservoirs and Fluxes Community Scientific Steering Committee, Smithsonian Institution National Museum of Natural History

Craig Schiffries

DCO Secretariat, Carnegie Institution of Washington

Matt Schrenk

DCO Deep Life Community Scientific Steering Committee, Michigan State University

VENUES

Conference Hotel (Included breakfast buffet begins each morning at 06:00)

Holiday Inn Munich–City Centre, Hochstraße 3, 81669

Icebreaker (Wednesday, 25 March, 18:00 – 20:00)

Holiday Inn Munich–City Centre, Hochstraße 3, 81669

Science Meeting (Thursday, 26 March, Registration and coffee, 08:00;

Program 09:00 - 17:00; Friday and Saturday, 27–28 March, Registration and coffee, 08:30; Program 09:00 - 17:00)

Deutsches Museum, Museumsinsel 1, 80538

DCO Community Dinners (Thursday, 26 March, 20:00 - 22:00)

Deep Energy and Deep Life, Restaurant Alter Hof, Alter Hof 3, 80331

Reservoirs and Fluxes and Extreme Physics and Chemistry, Zum Spöckmeier, Rosenstraße 9 (direct by the Marienplatz), D-80331

Poster Sessions (Friday, 27 March and Saturday, 28 March, 17:00 - 19:00)

Holiday Inn Munich–City Centre, Hochstraße 3, 81669

All-Conference Dinner (Saturday, 28 March, 20:00 - 22:00)

Hofbräukeller, Innere Wiener Straße 19, 81667

ICEBREAKER, Holiday Inn Munich–City Centre

WEDNESDAY, 25 MARCH

18:00 -20:00 *Icebreaker*

OVERVIEW:

**SCIENCE MEETING, POSTER SESSIONS, AND
THURSDAY AND SATURDAY EVENING DINNERS**

Science Meeting: Deutsches Museum

Poster Sessions: Holiday Inn Munich–City Centre

Dinners: See Venue info for locations

THURSDAY, 26 MARCH

08:00 - 09:00 *Registration and Coffee*

09:00 - 09:25 *Welcome*

09:25 - 10:40 *Thursday Morning Program I*

10:40 - 10:55 *Break*

10:55 - 12:35 *Thursday Morning Program II*

12:35 - 13:25 *Lunch*

13:25 - 15:05 *Thursday Afternoon Program I*

15:05 - 15:20 *Break*

15:20 - 17:00 *Thursday Afternoon Program II*

17:00 *Group Photo* (location at the museum to be announced)

20:00 - 22:00 *DCO Scientific Community Dinners*
(see Venue info for locations)

FRIDAY, 27 MARCH

08:30 - 09:00	<i>Registration and Coffee</i>
09:00 - 10:40	<i>Friday Morning Program I</i>
10:40 - 10:55	<i>Break</i>
10:55 - 12:35	<i>Friday Morning Program II</i>
12:35 - 13:25	<i>Lunch</i>
13:25 - 15:05	<i>Friday Afternoon Program I</i>
15:05 - 15:20	<i>Break</i>
15:20 - 17:00	<i>Friday Afternoon Program II</i>
17:00 - 19:00	<i>Friday Poster Session (Holiday Inn Munich–City Centre)</i>
	<i>Friday Evening Dinner</i> (schedule as you wish)

SATURDAY, 28 MARCH

08:30 - 09:00	<i>Registration and Coffee</i>
09:25 - 10:40	<i>Saturday Morning Program I</i>
10:40 - 10:55	<i>Break</i>
10:55 - 12:10	<i>Saturday Morning Program II</i>
12:35 - 13:25	<i>Lunch</i>
13:25 - 15:05	<i>Saturday Afternoon Program I</i>
15:05 - 15:20	<i>Break</i>
15:20 - 17:00	<i>Saturday Afternoon Program II</i>
17:00 - 19:00	<i>Saturday Poster Session</i> (Holiday Inn Munich–City Centre)
20:00 - 22:00	<i>All-Conference Dinner</i> (Hofbräukeller)

PRESENTATION SCHEDULE, Deutsches Museum

THURSDAY, 26 MARCH

09:00 - 09:25 *Welcome*
Craig Schiffries, DCO Secretariat
Donald Dingwell, Ludwig Maximilian University
Wolfgang Heckl, Deutsches Museum
Helmuth Trischler, Deutsches Museum

Morning Moderators: Donald Dingwell and Liz Cottrell

09:25 - 09:50 *Uncertainties and key open questions in the geological carbon cycle*
Mike Burton, University of Manchester
M Burton, F Arzilli

9:50 - 10:15 *Carbon in magmas; budgets and roles in volcanic processes*
Paolo Papale, Istituto Nazionale di Geofisica e Vulcanologia

10:15 - 10:40 *H₂O and CO₂ solubility in silicate melts at crustal/upper mantle pressures*
Mark Ghiorso, OFM Research

10:40 - 10:55 *Break*

10:55 - 11:20 *Undegassed carbon content from a highly depleted segment of the Mid-Atlantic Ridge (1-5 °S): Evidence from melt inclusions*
Marion Le Voyer, Carnegie Institution of Washington
M Le Voyer, K Kelley, E Cottrell, E Hauri

11:20 - 11:45 *CO₂ flux from East African Rift contributes significantly to global carbon emissions*
Tobias Fischer, University of New Mexico

11:45 - 12:10 *Mantle to surface: The role of CO₂ and magma plumbing system on volcanic activity at Kilauea volcano, Hawaii*
Helge Gonnermann, Rice University
HM Gonnermann, AP Blaser, D Ferguson, T Plank, E Hauri, BF Houghton, D Swanson

12:10 - 12:35 *Satellite detection of volcanic CO₂ degassing*
Christoph Popp, Smithsonian Institution National Museum of Natural History
C Popp, BJ Andrews, K Chance, E Cottrell

12:35 - 13:35 *Lunch*

Afternoon Moderators: Terry Plank and Craig Manning

13:25 - 13:50	<i>Melt inclusion records of magma mixing: Implications for magmatic volatile budgets</i> Marie Edmonds, University of Cambridge M Edmonds, D Neave, L Salem, J MacLennan, M Hartley
13:50 - 14:15	<i>Does deep carbon have a seismic signature?</i> Catherine McCammon, University of Bayreuth C McCammon, L Dubrovinsky, V Cerantola, I Kupenko, R Sinmyo, A Kantor, A Chumakov
14:15 - 14:40	<i>Carbon, nitrogen and water recycling in the mantle transition zone</i> Graham Pearson, University of Alberta DG Pearson, T Stachel, M Palot
14:40 - 15:05	<i>The deep mantle carbon cycle</i> Mike Walter, Bristol University M Walter, A Thomson, S Kohn
15:05 - 15:20	<i>Break</i>
15:20 - 15:45	<i>Viewing deep carbon in a diamond anvil cell</i> Wendy Mao, Stanford University
15:45 - 16:10	<i>Hidden carbon in Earth's inner core</i> Jackie Li, University of Michigan
16:10 - 16:35	<i>How isotopes can constrain the carbon in planetary cores</i> Anat Shahar, Carnegie Institution of Washington W Mao, M Reagan, A Gleason and E Schauble
16:35 - 17:00	<i>Ramp compression of carbon above 50 Mbar on the National Ignition Facility</i> Ray Smith, Lawrence Livermore National Laboratory RF Smith, JH Eggert, R Jeanloz, TS Duffy, DG Braun, JR Patterson, RE Rudd, J Biener, AE Lazicki, AV Hamza, J Wang, T Braun, LX Benedict, PM Celliers, GW Collins
17:00	<i>Group Photo</i> (location at museum to be announced)
20:00 - 22:00	<i>DCO Scientific Community Dinners</i> (see Venue info for locations)

FRIDAY, 27 MARCH

Morning Moderators: Matt Schrenk and Magali Ader

09:00 - 09:25	<i>Achievements and challenges for Continental Scientific Drilling: The new Science Plan of ICDP</i> Uli Harms, International Continental Scientific Drilling Program U Harms, B Horsfield, C Knebel
09:25 - 09:50	<i>Defining the temporal, physical and chemical framework for carbon speciation in the deep crust</i> Chris Ballentine, University of Oxford CJ Ballentine, B Sherwood Lollar, TC Onstott, G Lacrampe-Couloume, G Holland, L Li, GF Slater
09:50 - 10:15	<i>New estimates of global H₂, CH₄ and hydrocarbon production from the Precambrian crust</i> Chelsea Sutcliffe, University of Toronto CN Sutcliffe, CJ Ballentine, TC Onstott, C Glein, J McDermott, G Lacrampe-Couloume, B Sherwood Lollar
10:15 - 10:40	<i>Deep Underground Laboratory and Deep Energy: Exploration of the Songliao Basin, China</i> Chengshan Wang, China University of Geosciences
10:40 - 10:55	<i>Break</i>
10:55 - 11:20	<i>In situ microimaging of carbon speciation in serpentinites: implications for the diversity of associated abiotic organic molecules and deep ecosystems</i> Benedicte Ménez, Institut de Physique du Globe de Paris B Ménez, C Pisapia, E Gérard, M Andréani, D Brunelli, V Pasini, M Réfrégiers, F Jamme, M Seyler, M Gérard, M Quémeneur, A Postec, G Erauso, C Monnin, C Payri, B. Pelletier
11:20 - 11:45	<i>Natural and experimental serpentinization</i> Muriel Andreani, Université de Lyon
11:45 - 12:10	<i>Microbial carbon processing in serpentinizing subsurface ecosystems: Insights from the Coast Range Ophiolite Microbial Observatory</i> Matt Schrenk, Michigan State University
12:10 - 12:35	<i>Subseafloor methane budget and microbial players</i> Antje Boetius, AWI/MPI Bremen
12:35 - 13:25	<i>Lunch</i>

Afternoon Moderators: Craig Schiffries and Adrian Jones

13:25 - 13:50	<i>Lighting up the underworld</i> John Ludden, British Geological Survey
13:50 - 14:15	<i>Origin, movement and fate of methane from the Cayman hydrothermal vent fluids</i> Max Coleman, NASA JPL / Caltech M Coleman, J Eiler, D Stolper
14:15 - 14:40	<i>Principles and prospects of clumped methane isotopologues in deep carbon research</i> Shuhei Ono, Massachusetts Institute of Technology S Ono, DT Wang, DS Gruen
14:40 - 15:05	<i>Isotopic bond ordering: beyond temperature</i> Ed Young, University of California Los Angeles E Young, L Yeung
15:05 - 15:20	<i>Break</i>
15:20 - 15:45	<i>The co-evolution of the geo- and biospheres</i> Robert Hazen, Carnegie Institution of Washington RM Hazen, ES Grew, G Hystad, J Golden, RT Downs
15:45 - 16:10	<i>Reversibility of hydrothermal organic reactions</i> Everett Shock, Arizona State University E Shock, K Fecteau, K Robinson, K Johnson, C Bockisch, I Gould, L Williams, H Hartnett
16:10 - 16:35	<i>Effects of extreme pressure on microorganisms</i> Isabelle Daniel, Université de Lyon
16:35 - 17:00	<i>Exploring deep life in coal-bearing sediments down to ~2.5km below the seafloor</i> Fumio Inagaki, JAMSTEC F Inagaki, KU Hinrichs, and IODP Expedition 337 shipboard and shore-based scientists
17:00 - 19:00	<i>Friday Poster Session</i> (Holiday Inn Munich–City Centre)
	<i>Friday Evening Dinner</i> (schedule as you wish)

SATURDAY, 28 MARCH

Morning Moderators: Mitch Sogin and Isabelle Daniel

09:00 - 09:25	<i>Endolithic life in methane-derived carbonates</i> Victoria Orphan, California Institute of Technology
09:25 - 09:50	<i>Microbes in a highly dynamic terrestrial subsurface habitat</i> Kirsten Küsel, Friedrich Schiller University Jena
09:50 - 10:15	<i>Insights into deep terrestrial biosphere: From molecule- to ecosystem-level</i> Maggie Lau, Princeton University MCY Lau, C Magnabosco, C Cameron, DN Simkus, GF Slater, JM Labonte, R Stepanauskas, S Hendrickson, M Pullin, B Sherwood Lollar, O Kuloyo, B Linage, G Borgonie, E van Heerden, TL Kieft, TC Onstott
10:15 - 10:40	<i>What can we learn from microbial cell counts in subsurface sediments?</i> Jens Kallmeyer, GFZ Potsdam
10:40 - 10:55	<i>Break</i>
10:55 - 11:20	<i>Presence of oxygen and aerobic communities from seafloor to basement in deep-sea sediment</i> Steve D'Hondt, University of Rhode Island S D'Hondt, F Inagaki, C Alvarez-Zarikian, the IODP Expedition 329 Shipboard Scientific Party, LJ Abrams, CC McKinley, R Pockalny, J Sauvage
11:20 - 11:45	<i>Marine deep sediments as incubators of microbial life</i> Jan Amend, University of Southern California J Amend, D LaRowe
11:45 - 12:10	<i>The flux of organic carbon into the mantle</i> Terry Plank, Columbia University Lamont Doherty Earth Observatory T Plank, A Malinverno
12:10 - 12:35	<i>Graphitic carbon: recycling carbon between Earth's surface and interior</i> Olivier Beyssac, CNRS Institute of Mineralogy and Physics of Condensed Matter
12:35 - 13:25	<i>Lunch</i>

Afternoon Moderators: Wendy Mao and Claude Jaupart

13:25 - 13:50	<i>Understanding carbon mobility in deep fluids: What we need to know and why</i> Dimitri Sverjensky, Johns Hopkins University
13:50 - 14:15	<i>Ultrafast dynamics of fluid water and ices under pressure</i> Roberto Bini, LENS - University of Florence R Bini, S Fanetti, M Citroni
14:15 - 14:40	<i>Fluid densification, partition and transport under confinement - Possible relation to CH₄ synthesis</i> Alberto Striolo, University College London A Striolo, D Cole
14:40 - 15:05	<i>A thermodynamic model for oxidized C-O-H fluids in subduction zone fluids</i> Carmen Sanchez-Valle, Universitaet Muenster C Sanchez-Valle, D Mantegazzi, T Driesner
15:05 - 15:20	<i>Break</i>
15:20 - 15:45	<i>Advanced models for fluid-solid transport in subduction zones</i> Marc Spiegelman, Columbia University Lamont Doherty Earth Observatory M Spiegelman, C Wilson, P van Keken, B Hacker
15:45 - 16:10	<i>Re-evaluating carbon fluxes in subduction zones: What goes down, mostly comes up</i> Peter Kelemen, Columbia University Lamont Doherty Earth Observatory P Kelemen, CE Manning
16:10 - 16:35	<i>The rise of experimental volcanology: Opportunities for Deep Carbon?</i> Don Dingwell, Ludwig Maximilian University
16:35 - 17:00	<i>Looking ahead to 2019: DCO synthesis and integration</i> Robert Hazen and Russell Hemley, DCO Secretariat
17:00 - 19:00	<i>Saturday Poster Session</i> (Holiday Inn Munich–City Centre)
20:00 - 22:00	<i>All-Conference Dinner</i> (Hofbräukeller)

POSTER SESSIONS, Holiday Inn Munich–City Centre

FRIDAY, 27 MARCH – RESERVOIRS AND FLUXES POSTERS

Variations in Mid-Ocean Ridge CO₂ Emissions Driven by Glacial Cycles

JMA Burley, RF Katz

Catalogue of the main gas manifestation of Greece: a basis for nationwide estimations of gas hazard and total geogenic gas output

S Calabrese, K Daskalopoulou, K Kyriakopoulos, W D'Alessandro

Diffuse CO₂ Earth degassing in Italy: a globally relevant study case

C Cardellini, G Chiodini, D Frondini, A Frigeri, S Caliro

Global mapping of CO₂ fluxes and mantle CO₂ content along mid-ocean ridges

D Chavrit, E Humler, O Grasset

Constraints on the carbon content of the Iceland plume, from laser-ablation C-He-Ar analyses of individual vesicles in a volcanic glass from Iceland

A Colin, M Moreira, C Gautheron, P Burnard

Characterization of the biotic and abiotic processes that control the geochemistry of the fluids circulating in the Kizildag ophiolitic body (Turkey)

W D'Alessandro, G Yuce, F Italiano, S Bellomo, AH Gulbay

The Network for Observation of Volcanic and Atmospheric Change (NOVAC) and its relation to DECADE

B Galle, S Arellano, A Aiuppa, F Gil, A Munos, M De Moor, G Garzon, the NOVAC team

CO₂ emissions from plate boundary faults: the case of the San Andreas Fault System

DR Hilton, T Evans, JT Kulongoski, CJ Ramirez, K Blackmon, PH Barry

A mantle source for carbon in continental intraplate volcanism: identifying the source using petrology and geochemistry

Emma R Humphreys-Williams, D Ken Bailey, Frances Wall, Chris J Hawkesworth, Teresa Jeffries

An overview of the UK consortium 'Mantle Volatiles: Processes, Reservoirs and Fluxes

R Jones, C Ballentine, R Burgess, J Davidson, H Davies, CJ de Hoog, T Elliott, J Harvey, F Jenner, R Katz, S Kelley, L Kirstein, J Maclennan, T Mather, D Porcelli, D Pyle, I Savov, J Rudge, S Watt, H Williams, B Wood, O Shorttle, K Kiseeva, J Wade

Looking through diamond at garnet-bearing lithologies in the transition zone

Ekaterina S Kiseeva, Duane J Smythe, Anke Wohlers, Bernard J Wood

Using zoning in diamonds to constrain the history and nature of diamond-forming fluids in the mantle

SC Kohn, L Speich, GP Bulanova, CB Smith

Temporal variations in CO₂ flux measures and its correlation between atmospheric parameters: a case study from Lipari island (Sicily, Italy)

M Lelli, B Raco, G Virgili, D Continanza

Subduction to eruption: The volatile life of ocean island basalts unveiled by CO₂, H₂O, S, Fl, and Cl contents in mineral-hosted melt inclusions

Jared P Marske, Erik H Hauri, Frank A Trusdell, Michael O Garcia, Aaron J Pietruszka

Do diamondites herald new information about carbon cycling, silicate melting, and metasomatic events in the sub-cratonic mantle beneath Southern Africa?

Sami Mikhail, Francis McCubbin, Frances Jenner, Roxanne Bowden, Doug Rumble, Steven B Shirey, John J Gurney

A petrological assessment of the mantle nitrogen cycle as recorded by diamonds implies occasional decoupling of nitrogen from carbon and the noble gases

Sami Mikhail, Dimitri Sverjensky, Daniel Howell

Development of a field-portable He-isotope detector: A novel instrumental approach for quantitative assessment of magma compositional dynamics and monitoring fluxes of magmatic volatiles

Gary M McMurtry, David R Hilton

Isotopic constraints on the signal of magmatic carbon

S Shilobreeva, V Polyakov, I Martinez, V Busigny, P Agrinier, J Alt, M Javoy

CO₂ degassing zones in various volcanic systems of the Azores archipelago (Portugal) – continuous and discrete measurements

Fátima Viveiros, Carlo Cardellini, Teresa Ferreira, Stefano Caliro, Giovanni Chiodini, Catarina Silva, Maria Pedone, César Andrade, Vittorio Zanon, AR Hipólito

FRIDAY, 27 MARCH – DEEP LIFE POSTERS

Nucleic acids suggest activity and preservation on the subsurface Iberian margin
J Biddle, J Russell

It is crowded down under

G Borgonie, BH Linage-Alvarez, AO Ojo, SOC Mundle, LB Freese, C Van Rooyen, O Kuloyo, J Albertyn, C Pohl, ED Cason, J Vermeulen, C Pienaar, D Litthauer, H Van Niekerk, J Van Eeden, B Sherwood-Lollar, TC Onstott, E Van Heerden

Metagenomic investigations of serpentinization-powered microbial ecosystems

William J Brazelton, Katrina I Twing, Matthew O Schrenk

Functional metagenomics of igneous minerals incubated in the suboceanic aquifer

Frederick Colwell, Amy Smith, Martin Fisk, Olivia Mason, Andrew Thurber, Gilberto Flores, Radu Popa

Exploring life's limits: Deep geobiochemistry

Alysia Cox, Arizona State University

Interactions of ribonucleotides with aluminum and iron oxide minerals under varying environmental conditions

Cecile Feuillie, Mathieu Pedrot, Dimitri Sverjensky, Robert Hazen

High reactivity of deep biota under anthropogenic CO₂ injection into basalt

E Gérard, P le Campion, R Trias, SR Gíslason, HA Alfreðsson, KG Mesfin, SO Snæbjörnsdóttir, ES Aradóttir, I Gunnarsson, B Ménez

Spatial and temporal diversity of microbial mats in the shallow-water hydrothermal system of Milos Island (Greece)

Donato Giovannelli, Dionysis Foustoukos, Nadine Le Bris, Stefan M Sievert, Mustafa Yucel, Costantino Vetriani

Insight into the evolution of carbon fixation revealed by comparative genomic and proteomic analyses of the anaerobic chemosynthetic bacterium

Thermovibrio ammonificans

Donato Giovannelli, Stefan M Sievert, Michael Hügler, Thomas Schweder, Costantino Vetriani

Fungal-prokaryotic consortium in subseafloor basalts

M Ivarsson

Workshop to develop deep life continental scientific drilling projects

TL Kieft, TC Onstott, L Ahone, V Aloisi, FS Colwell, B Engelen, S Fendrihan, E Gaidos, U Harms, I Head, J Kallmeyer, B Kiel Reese, L-H Lin, PE Long, H Mills, DP Moser, P Sar, D Schulze-Makuch, H Stan-Lotter, D Wagner, P-L Wang, F Westall, MJ Wilkins

The importance of the in situ nitrogen cycle to the terrestrial subterranean carbon cycle: How? By whom?

MCY Lau, C Magnabosco, R Alleva, W Wang, D Perlman, S Kyin, S Smart, DM Sigman, S Maphanga, E van Heerden, TC Onstott

Linking deep subsurface microbial dark matter to their carbon cycling functions

K Lloyd

Never was so much carbon owed by so many to so few or “This is what you get for combining isotopes with metagenomes”

TC Onstott, DN Simkus, GF Slater, B Sherwood Lollar, K Wilkie, TL Kieft, C Magnabosco, MCY Lau, M J Pullin, SB Hendrickson, KE Wommack, EG Sakowki, E van Heerden, O Kuloyo, B Linage-Alvarez, G Borgonie

Metabolic ecology of chemosynthetic nitrate reducing Epsilonproteobacteria and Aquificae from deep-sea vents

I Perez-Rodriguez, D Foustoukos, SM Sievert, ML Fogel

Total and active microbial community structure within North Pond sediments

BK Reese, L Zinke, H Mills, P Girguis, B Orcutt, K Edwards, J Amend

Cabeço de Vide metagenome, a work in progress

I Tiago, MO Schrenk, A Verissimo

Carbon-cycling genes of microbes from the serpentinite subsurface environment

KI Twing, WJ Brazelton, and MO Schrenk

Microbial populations in iron-rich sediments of Lake Towuti at varying bottom water oxygenation levels – Results of a pilot study for the 2015 ICDP drilling campaign

Aurèle Vuillemin, André Friese, Mashal Alawi, Dirk Wagner, Jens Kallmeyer

Reconsidering the roles of archaea in carbon cycling in marine sediments

F Wang

FRIDAY, 27 MARCH – SECRETARIAT POSTERS

Pinch: An interactive, exploratory data visualization framework for high-throughput sequencing datasets

Holly M Bik, Pitch Interactive

Increasing the use of existing scientific collections for Deep Carbon Observatory projects

B Blakeney DeJarnett

Towards volcanic field deployment of the laser isotope ratio-meter

R Brownsword, D Weidmann

Progress in DCO simulation projects using the DCO computer cluster

P Fox

Enabling the Science Network of DCO - Status and directions

Peter Fox, John Erickson, Patrick West, Marshall Ma, *et al*

2nd DCO Early Career Workshop

Donato Giovannelli, Alysia Cox, Daniel Hummer, Katie Pratt, Cody Sheik, Dana Thomas, Fatima Viveiros

Ultrafast laser instrument for in situ measurements of elastic, electronic, and transport properties of carbon-bearing fluids and crystalline materials

A Goncharov

DCO Secretariat: Coordination, integration, and governance

Robert Hazen, Russell Hemley, Craig Schiffries, Andrea Mangum, Yael Fitzpatrick

DCO Engagement: Connect, collaborate, communicate

Sara Hickox, Sunshine Menezes, Katie Pratt, Frank Baker, Josh Wood, Darrell McIntire

Planned Oman Drilling Project

Peter Kelemen, Jürg Matter, Damon Teagle, Raeid Abed, Ali Al Rajhi, Zahir Al Suleimani, Shoji Arai, Wolfgang Bach, Francoise Boudier, Georges Ceuleneer, Laurence Coogan, Greg Dipple, Gretchen Früh-Green, Kathy Gillis, Marguerite Godard, Dave Goldberg, Steve Goldstein, Philippe Gouze, Greg Hirth, Albrecht Hofmann, Benoit Ildefonse, Bjørn Jamtveit, Jürgen Koepke, Charlie Langmuir, Christopher MacLeod, Craig Manning, Katsuyoshi Michibayashi, Jay Miller, Sumio Miyashita, Sobhi Nasir, Adolphe Nicolas, Oliver Plümper, Matt Schrenk, Barbara Sherwood Lollar, Everett Shock, Satish Singh, Eiichi Takazawa, Alexis Templeton, Susumu Umino, Jessica Warren, Wenlu Zhu

Formal specification of data types in the Deep Carbon Observatory Data Portal

Xiaogang (Marshall) Ma, John Erickson, Patrick West, Peter Fox, Han Wang, Yu Chen

Novel synchrotron x-ray probes for deep carbon

W Mao

VGAM: Volcanic Gas Analytical Monitor using compact, low-power mass spectrometry for in-situ multi-species determinations

Gary McMurtry, Tobias Fischer

Quantum cascade laser-infrared absorption spectrometer for clumped methane isotope thermometry

Shuhei Ono, David T Wang, Danielle S Gruen

DCO high-pressure biological sampler and transporter user facility

Karyn L Rogers, Anaís Cario, Hervé Cardon, Isabelle Daniel

Deep time, deep subduction, deep gas, and certain transparent gemstones

J Saul

Evolution of the composition of Siberian craton lithosphere during interaction with Siberian flood basalt (SFB) province

NV Sobolelv, AV Sobolev, DV Kuzmin, AA Tomilenko, VG Batanova, AM Logvinova, AV Tolstov, SI Kostrovitsky

Abiotic hydrocarbons on other worlds

S Soter

A combined instrument for molecular imaging in geochemistry

A Steele, J Toporski, S Siljestrom, Y Goreva

Novel large-volume diamond anvil cell (LV-DAC) for neutron scattering

C Tulk, M Guthrie, R Boehler, J Molaison, R Hemley

Beyond a Data Portal: A collaborative environment for the deep carbon science communities

Han Wang, Yu Chen, Patrick West, John Erickson, Xiaogang Ma, Peter Fox

A unique high-mass-resolution gas-source mass spectrometer

E Young, D Rumble, P Freedman

SATURDAY, 28 MARCH – DEEP ENERGY POSTERS

The Dziani Dzaha volcanic crater lake, a cauldron for deep CO₂ conversion into bioenergy

P Cadeau, P Alberic, D Jezequel, G Sarazin, G Abril, M Ader, C Leboulanger, E Fouilland, E Le Floc'h, P Got, M Bouvy, C Bernard, HAgogué, C Duval, M Cellamare

Redox state of iron during high pressure serpentinite dehydration

BP Debret

Speciation of carbon in different sites of the oceanic lithosphere and implication on carbon cycle

A Delacour, M Andreani, G Früh-Green, S Bernasconi, P Schaeffer

A high pH ocean on Enceladus as evidence of serpentinization

Chris Glein, John Baross, Hunter Waite

Formation of reduced C compounds using natural catalysts

Isabelle Martinez, Christèle Vacquand, Karine Vigier de Oliveira, Nadir Recham, Fabrice Brunet, François Jérôme

Unconventional generation of hydrocarbon gases in the solimoes basin, northwest Brazil: the role of the siderite-water interaction

V Milesi, A Prinzhofer, F Guyot, F Brunet, L Richard, M Benedetti, L Dairou

The global terrestrial subsurface biosphere: A geographic and geologic synopsis

T Onstott

Experimental carbonation of peridotites

Steve Peuble, Muriel Andreani, Marguerite Godard, Philippe Gouze, Bertrand Van de Moortele, Bruno Reynard, Isabelle Daniel

Thermodynamic properties of metamorphic kerogens

L Richard, E Brosse, T Parra

Reduced carbon in Earth: An updated isotopic diagram of abiotic methane

M Schoell, G Etiope

Episodic organic carbon burial during the Phanerozoic indicated by a new atmospheric pO₂ record

M Schoell, R Tappert, K Muehlenbachs, AP Wolfe, RC McKellar

MATE: MethAne TEchnology: microbial designers of a fuel for the future

A Stadnitskaia

Potentials for major abiogenic hydrocarbon formation by serpentinization offshore SE-Brazil

Peter Szatmari, Luciano Magnavita

Noble gas time constraints on formation of hydrocarbon materials

I Tolstikhin, C Ballentine, B Polyak, E Prasolov, O Kikvadze

Constraining isolation ages of Archean deep carbon systems using noble gases

Oliver Warr, Jon Fellowes, Barbara Sherwood-Lollar, Chelsea Sutcliffe, Chris Ballentine

SATURDAY, 28 MARCH – EXTREME PHYSICS AND CHEMISTRY POSTERS

Thermodynamics of planetary ices in extreme conditions of icy satellites

Jennifer Beam, Jung-Fu Lin, Jin Liu, Jing Yang, Ye Wu

Hydrate and ice nucleation triggered by carbon

Yuanfei Bi, Raffaella Cabriolu, Tianshu Li

Tetrahedrally coordinated carbonates in Earth's lower mantle

E Boulard, D Pan, G Galli, Z Liu, WL Mao

Carbon in aqueous fluids: an experimental study at supercritical conditions

E Boulard, D Testemale, J-L Hazemann

Thermodynamics of the diagenetic transformations of lipid biomarkers

G Boyer, E Shock

Carbon in the core: how good and how much?

R Caracas

High-pressure investigation of phase relations and transitions of iron-bearing carbonates

V Cerantola, C McCammon, I Kuppenko, E Bykova, M Merlini, L Ismailova, S Petitgirard, A Chumakov, L Dubrovinsky

Experimental constraints on CO₂ solubility in rhyolitic melts – Implications for carbon flux in subduction zones

M Duncan, R Dasgupta

Carbon speciation in saline solutions in equilibrium with aragonite under subduction zones conditions

Sébastien Facq, Isabelle Daniel, Gilles Montagnac, Hervé Cardon, Dimitri A Sverjensky

Pressure effect on the ultra-fast dynamics of solutions

Samuele Fanetti, Marco Pagliai, Andrea Lapini, Margherita Citroni, Sandro Scandolo, Roberto Righini, Roberto Bini

Diamond formation in eclogitic rocks

Daniel Frost, Vincenzo Stagno, Christopher Beyer

Viscosity of carbonate-silicate melts using ultra-high resolution falling sphere viscometry

Daniel Hummer, Craig Manning, Abby Kavner, Yoshio Kono, Changyong Park, Curtis Kenney-Benson

High-pressure structures and properties of noble gas clathrates and inclusion compounds

Dennis D Klug, Hanyu Liu, Yansun Yao, and Cristopher A Tulk

Ferromagnetite in the Earth's deep Mantle

Jung-Fu Lin, Jin Liu, Jill Yang, Zhu Mao, Caleb Jacobs, Vitali Prakapenka

Optical properties of siderite (FeCO₃) across the spin transition in P-T conditions of the lower mantle

Sergey S Lobanov, Alexander F Goncharov, Konstantin D Litasov

New experimental data on carbonate structures at high pressures and high temperatures

M Merlini

Physics of monolayer and bilayer graphene under hydrostatic pressure

Avinash P Nayak, Cheng Tan, Xiao-han Wang, Twinkle Pandhi, Jin Liu, Li Tao, Deji Akinwande, Jung-Fu Lin

CO₂-IV at high pressure and temperature, a neutron diffraction study

Sarah Palaich, Adam Makhluf, Afu Lin, Malcolm Guthrie, Jamie Molaison, Chris Tulk, Abby Kavner, Craig E Manning

Carbon mobility by hydrous Ca-carbonate liquids at subduction zones

S Poli

Moissanite (SiC) stability in the Earth's mantle

A Rohrbach, MW Schmidt, C Gao, A Golubkova, JAD Connolly

A thermodynamic model for oxidized C-O-H fluids in subduction zone fluids

C Sanchez-Valle, D Mantegazzi, T Driesner

Equation of state and sound velocity of Fe₃C at high pressure and temperature, and implications for carbon in the inner core

Suguru Takahasi, Eiji Ohtani, Seiji Sakamaki, Tatsuya Sakamaki, Naohisa Hirao, Hiroshi Fukui, Alfred Q. Baron

Singly bonded layered planar nitrogen (LP-N) at extreme conditions

D Tomasino, M Kim, J Smith, CS Yoo

Variable cage occupancy of hydrogen filled clathrate hydrates

C Tulk, D Klug, J Molaison, C Koh

The DFG Research Unit 2125: Structures, properties and reactions of carbonates at high pressures and temperatures

Bjoern Winkler, Karen Appel, Lkhamsuren Bayarjargal, Natalia Dubrovinskaia, Leonid Dubrovinsky, Gerhard Heide, Sandro Jahn, Monika Koch-Müller, Edwin Kroke, Catherine McCammon, Sergio Speziale, Christian Sternemann, Max Wilke

CO₂ released from carbonated eclogites during their exhumation

Jianjiang Zhu, Renbiao Tao and Yingwei Fei

SATURDAY, 28 MARCH – SECRETARIAT POSTERS

Increasing the use of existing scientific collections for Deep Carbon Observatory projects

B Blakeney DeJarnett

Towards volcanic field deployment of the laser isotope ratio-meter

R Brownsword, D Weidmann

Progress in DCO simulation projects using the DCO computer cluster

P Fox

Enabling the Science Network of DCO - Status and directions

Peter Fox, John Erickson, Patrick West, Marshall Ma, et al

2nd DCO Early Career Workshop

Donato Giovannelli, Alysia Cox, Daniel Hummer, Katie Pratt, Cody Sheik, Dana Thomas, Fatima Viveiros

Ultrafast laser instrument for in situ measurements of elastic, electronic, and transport properties of carbon-bearing fluids and crystalline materials

A Goncharov

DCO Secretariat: Coordination, integration, and governance

Robert Hazen, Russell Hemley, Craig Schiffries, Andrea Mangum, Yael Fitzpatrick

DCO Engagement: Connect, collaborate, communicate

Sara Hickox, Sunshine Menezes, Katie Pratt, Frank Baker, Josh Wood, Darrell McIntire

Planned Oman Drilling Project

Peter Kelemen, Jürg Matter, Damon Teagle, Raeid Abed, Ali Al Rajhi, Zahir Al Suleimani, Shoji Arai, Wolfgang Bach, Françoise Boudier, Georges Ceuleneer, Laurence Coogan, Greg Dipple, Gretchen Früh-Green), Kathy Gillis, Marguerite Godard, Dave Goldberg, Steve Goldstein, Philippe Gouze, Greg Hirth, Albrecht Hofmann, Benoit Ildefonse, Bjørn Jamtveit, Jürgen Koepke, Charlie Langmuir, Christopher MacLeod, Craig Manning, Katsuyoshi Michibayashi, Jay Miller, Sumio Miyashita, Sobhi Nasir, Adolphe Nicolas, Oliver Plümper, Matt Schrenk, Barbara Sherwood Lollar, Everett Shock, Satish Singh, Eiichi Takazawa, Alexis Templeton, Susumu Umino, Jessica Warren, Wenlu Zhu

Novel synchrotron x-ray probes for deep carbon

W Mao

VGAM: Volcanic Gas Analytical Monitor using compact, low-power mass spectrometry for in situ multi-species determinations

Gary McMurtry, Tobias Fischer

Quantum cascade laser-infrared absorption spectrometer for clumped methane isotope thermometry

Shuhei Ono, David T Wang, Danielle S Gruen

Geochemical signs of hydrocarbon migration and re-formation of oil fields

Irina Plotnikova, Sergey Ostroukhov, Fidania Nosova, Gulmira Salakhidinova, Nikita Pronin

DCO high-pressure biological sampler and transporter user facility

Karyn L Rogers, Anaïs Cario, Hervé Cardon, Isabelle Daniel

A combined instrument for molecular imaging in geochemistry

A Steele, J Toporski, S Siljestrom, Y Goreva

Novel large-volume diamond anvil cell (LV-DAC) for neutron scattering

C Tulk, M Guthrie, R Boehler, J Molaison, R Hemley

A unique high-mass-resolution gas-source mass spectrometer

E Young, D Rumble, P Freedman

**DEEP CARBON OBSERVATORY
SECOND INTERNATIONAL SCIENCE MEETING
26–28 MARCH 2015, MUNICH, GERMANY**

MEETING PARTICIPANTS

Magali Ader, Institut de Physique du Globe de Paris, France
Bill Allman, Smithsonian Institution, USA
Jan Amend, University of Southern California, USA
Muriel Andreani, Université de Lyon, France
Jesse Ausubel, Rockefeller University/Sloan Foundation, USA
Wolfgang Bach, University of Bremen, Germany
Chris Ballentine, University of Oxford, UK
Douglas Bartlett, Scripps Institution of Oceanography/UCSD, USA
Olivier Beyssac, CNRS IMPMC, France
Jennifer Biddle, University of Delaware, USA
Holly Bik, University of Birmingham, UK
Roberto Bini, LENS - University of Florence, Italy
Beverly Blakeney DeJarnett, University of Texas Bureau of Economic Geology, USA
Antje Boetius, University of Bremen, Germany
Gaetan Borgonie, Extreme Life Isyensya, Belgium
Eglantine Boulard, Institut Neel, France
Marshall Bowles, University of Bremen, Germany
Grayson Boyer, Arizona State University, USA
William Brazelton, University of Utah, USA
Michael Burton, University of Manchester, UK
Sergio Calabrese, University of Palermo – DiSTeM, Italy
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Adélie Delacour, Université Jean Monnet, France
Donald Dingwell, Ludwig Maximilian University – University of Munich, Germany
Larissa Dobrzhinetskaya, University of California at Riverside, USA
Leonid Dubrovinsky, BGI/Bayreuth University, Germany
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Cecile Feuillie, Carnegie Institution of Washington, USA

Tobias Fischer, University of New Mexico, USA
Yael Fitzpatrick, Carnegie Institution of Washington, USA
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Giulia Galli, University of Chicago, USA
Mark Ghiorso, OFM Research, USA
Donato Giovannelli, Rutgers University, USA
Christopher Glein, University of Toronto, Canada
Nir Goldman, Lawrence Livermore National Laboratory, USA
Alexander Goncharov, Carnegie Institution of Washington, USA
Helge Gonnermann, Rice University, USA
Danielle Gruen, Massachusetts Institute of Technology/WHOI, USA
Uli Harms, International Continental Scientific Drilling Program, Germany
Erik Hauri, Carnegie Institution of Washington, USA
Robert Hazen, Carnegie Institution of Washington, USA
Wolfgang Heckl, Deutsches Museum, Germany
Russell Hemley, Carnegie Institution of Washington, USA
Sara Hickox, University of Rhode Island, USA
David Hilton, Scripps Institution Oceanography/UC San Diego, USA
Kai-Uwe Hinrichs, University of Bremen, Germany
Tori Hoehler, NASA Ames Research Center, USA
Daniel Hummer, University of California Los Angeles, USA
Fumio Inagaki, JAMSTEC, Japan
Claude Jaupart, Institut de Physique du Globe de Paris, France
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Rosie Jones, University of Oxford, UK
Jens Kallmeyer, GFZ Potsdam, Germany
Richard Katz, University of Oxford, UK
Peter Kelemen, Columbia University Lamont Doherty Earth Observatory, USA
Thomas Kieft, New Mexico Tech, USA
Brandi Kiel Reese, Texas A&M University, USA
Kate Kiseeva, Oxford University, UK
Dennis Klug, National Research Council of Canada, UK
Simon Kohn, University of Bristol, UK
Yoshio Kono, Carnegie Institution of Washington, USA
Kirsten Kuesel, Aquatic Geomicrobiology, Germany
Kirsten Küsel, Friedrich Schiller University Jena, Germany
Vladimir Kutcherov, KTH Royal Institute of Technology, Sweden
Chui Yim "Maggie" Lau, Princeton University, USA
Matteo Lelli, Institute of Geoscience and Earth Resources, Italy
Steffen Leth, Jørgensen University of Bergen/CGB, Norway
Mark Alexander Lever, ETH Zürich, Switzerland
Marion Le Voyer, Carnegie Institution of Washington, USA
Jie Li, University of Michigan, USA
Tianshu Li, George Washington University, USA
Jung-Fu Lin, University of Texas at Austin, USA
Borja Linage-Alvarez, University of Free State, South Africa
Konstantin Litasov, V.S. Sobolev Institute of Geology and Mineralogy, Russia
Tingting Liu, The Ohio State University, USA

Karen Lloyd, University of Tennessee, USA
John Ludden, British Geological Survey, UK
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Ananya Mallik, Bayerisches Geoinstitut, Germany
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Craig Manning, University of California Los Angeles, USA
Wendy Mao, Stanford University, USA
Jared Marske, DTM, Carnegie Institution for Science, USA
Isabelle Martinez, Institut de Physique du Globe de Paris, France
Bernard Marty, CRPG-CNRS, University of Lorraine, France
Catherine McCammon, University of Bayreuth, Germany
Gary McMurtry, SOEST/University of Hawaii, USA
Benedicte Menez, Institut de Physique du Globe de Paris, France
Sunshine Menezes, University of Rhode Island, USA
Marco Merlini, Università degli Studi di Milano, Italy
Alexandra Navrotsky, University of California Davis, USA
Eiji Ohtani, Tohoku University, Japan
Salim Ok, The Ohio State University, USA
Shuhei Ono, Massachusetts Institute of Technology, USA
Tullis Onstott, Princeton University, USA
Victoria Orphan, California Institute of Technology, USA
Ding Pan, University of Chicago, USA
Graham Pearson, University of Alberta, Canada
Ileana Perez-Rodriguez, Carnegie Institution of Washington, USA
Steve Peuble, Université de Lyon, France
Terry Plank, Columbia University Lamont Doherty Earth Observatory, USA
Irina Plotnikova, Kazan Federal University, Russia
Stefano Poli, University of Milano, Italy
Christoph Popp, Smithsonian Institution National Museum of Natural History, USA
Katie Pratt, University of Rhode Island, USA
Simon Redfern, University of Cambridge, UK
Brandi Reese, Texas A&M University, USA
Laurent Richard, Consulting Geochemist, Spain
H-Holger Rogner, International Institute for Applied Systems Analysis, Austria
Arno Rohrbach, Institute of Mineralogy, University of Münster, Germany
Carmen Sanchez-Valle, Westfaelische Wilhelms-Universitaet Muenster, Germany
John Saul, Independent Researcher, France
Craig Schiffries, Carnegie Institution of Washington, USA
Max Schmidt, ETH Zürich, Switzerland
Martin Schoell, GasConsult International Inc., USA
Matt Schrenk, Michigan State University, USA
Anat Shahar, Carnegie Institution of Washington, USA
Cody Sheik, University of Michigan, USA
Svetlana Shilobreeva, GEOKHI RAS, Russia
Everett Shock, Arizona State University, USA
Raymond Smith, Lawrence Livermore National Laboratory, USA
Nikolay Sobolev, Institute of Geology and Mineralogy/Russian Academy of Sciences, Russia
Mitch Sogin, Marine Biological Laboratory, USA
Steven Soter, American Museum of Natural History, USA
Marc Spiegelman, Columbia University Lamont Doherty Earth Observatory, USA

Alina Stadnitskaia, Royal Netherlands Institute for Sea Research, The Netherlands
Alberto Striolo, University College London, UK
Chelsea Sutcliffe, University of Toronto, Canada
Dimitri Sverjensky, Johns Hopkins University, USA
Jason Sylvan, University of Southern California, USA
Peter Szatmari, Petrobras, Brazil
Igor Tiago, CNC University of Coimbra, Portugal
Igor Tolstikhin, Geological Institute KSC RAS, Russia
Helmuth Trischler, Deutsches Museum, Germany
Chris Tulk, Oak Ridge National Laboratory, USA
Simone Tumiatei, Università di Milano, Italy
Katrina Twing, Michigan State University, USA
Giorgio Virgili, West Systems Srl, Italy
Fátima Viveiros, CVARG/University of the Azores, Portugal
Michael Walter, University of Bristol, UK
Chengshan Wang, China University of Geosciences (Beijing), China
Fengping Wang, Shanghai Jiao Tong University, China
Han Wang, Rensselaer Polytechnic Institute, USA
Oliver Warr, University of Oxford, UK
Daniel Weidendorfer, ETH Zürich, Switzerland
Damien Weidmann, Rutherford Appleton Laboratory, UK
Bjoern Winkler, Goethe University Frankfurt, Germany
Roland Winter, TU Dortmund University, Germany
Gert Wörheide, Ludwig Maximilian University – University of Munich, Germany
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